ERAL LIBRARY
NOV 19
IV. OF ILL.

Journal of Educational Research

Official Organ of the National Association of Directors of Educational Research

B. R. BUCKINGHAM, Editor
Associate Editors
E. J. Ashbaugh — W. W. Charters — George D. Strayer
Leonard P. Ayres — J. A. Courtis — Lewis M. Terman
Walter S. Monroe

VOL. II OCTOBER, 1920 No. 3

CONTENTS

The Use of Group Mental Tests in the Guidance of Eighth-Grade and High-School Pupils, *Virgil E. Dickson* 601
Educational Measurement in Grand Rapids, *Charles D. Dawson* ... 611
The Selection of Silent Reading Textbooks, *Ernest Horn* 615
Grouping by Standardized Tests for Instructional Purposes, *Sarah P. Keiner* 620
Curriculum Content of a High-School Spelling Course, *A. G. Capps* . 626
A Comparative Study, by Educational Measurements, of One-Room Rural-School Children and City-School Children, *J. Crosby Chapman* and *H. L. Eby* 636
Common School Finance in Colorado and Certain Inferences of National Import, *Fletcher Harper Swift* 647
Editorials 668
Reviews and Abstracts 673
News Items and Communications 675
National Association of Directors of Educational Research 679

Entered as second-class matter January 13, 1920, at the Post Office at Menasha, Wisconsin, under the act of March 3, 1879.

Journal of Educational Research

Copyright 1920, by
Public School Publishing Co.

Published for the Bureau of Educational Research, University of Illinois

Editor-in-Chief: **B. R. Buckingham**
Director of Bureau of Educational Research, University of Illinois

Associate Editors

E. J. ASHBAUGH, *Ex-Officio, Secretary of Research Association, University of Iowa, Iowa City*
LEONARD P. AYRES,
Ed'l Sec'y, Russell Sage Foundation, N. Y.
W. W. CHARTERS,
Carnegie Inst. Tech., Pittsburgh
S. A. COURTIS,
City Schools, Detroit, Mich.
WALTER S. MONROE,
University of Illinois, Urbana, Ill.
GEORGE D. STRAYER,
Columbia University, New York City
LEWIS M. TERMAN,
Leland Stanford Junior University, Stanford University, Calif.

Contributing Editors

VIRGIL E. DICKSON,
Director, Bureau of Research and Guidance, Public Schools, Oakland and Berkeley, California.
CHARLES FORDYCE,
Dean Teachers' College, and Director of Bureau of Educational Measurements, University of Nebraska.
WILLIAM S. GRAY,
Dean College of Education, University of Chicago.
M. E. HAGGERTY,
Director Bureau of Co-operative Research, University of Minnesota.
V. A. C. HENMON,
Director School of Education, University of Wisconsin.
ARTHUR W. KALLOM,
Assistant Director Department of Educational Investigation and Measurement, Public Schools, Boston, Mass.
F. J. KELLY,
Dean, School of Education and Director Bureau of School Service, University of Kansas.
ROBT. H. LANE,
Assistant Superintendent of Schools, Los Angeles, Calif.
WILLIAM A. McCALL,
Assistant Professor of Education, Teachers' College, Columbia University.
GEORGE W. MELCHER,
Director Bureau of Research and Efficiency, Public Schools, Kansas City, Missouri.
EUGENE A. NIFENECKER,
Assistant Director Bureau of Reference, Research, and Statistics, Public Schools, New York City.
JOSEPH P. O'HERN,
Assistant Superintendent of Schools and Director of Efficiency Bureau, Public Schools, Rochester, New York.
LEON O. SMITH,
Assistant Superintendent (in charge of Educational Research) Public Schools, Omaha, Nebraska.
CLARENCE W. SUTTON,
Director Division of Reference and Research, Public Schools, Cleveland, Ohio.
W. W. THEISEN,
Director of Division of Reference and Research, Cleveland, Ohio.
CLIFFORD WOODY,
Professor of Education, University of Washington.

THE JOURNAL OF EDUCATIONAL RESEARCH is published at 450 Ahnaip St., Menasha, Wis. monthly except July and August by Geo. Banta, Official Printer to the Public School Publishing Co. The subscription price is $4.00; $4.30 in Canada or Mexico; and $4.50 in other foreign countries.

The editorial office is at Urbana, Illinois. Address all communications on educational matters, articles for the magazine, etc. to B. R. Buckingham, University of Illinois, Urbana, Illinois.

The JOURNAL OF EDUCATIONAL RESEARCH is both needed by and needs the subscriptions of many more teachers and school officers.

The title page and index for Volume I will be furnished with the September, 1920, number.

The Public School Publishing Company conducts the subscription work. Send all orders to them at Bloomington, Illinois.

Articles to Appear Soon

Value of a Handwriting Scale to an Untrained Teacher by *R. L. Morton*.

Reliability of the Binet Scale and Pedagogical Scales by *Arthur S. Otis* and *Herbert E. Knollin*.

Reliability of Test Scores by *Truman L. Kelley*.

Journal of Educational Research

Editorial Office, Urbana, Illinois — Editor-in-chief B. R. Buckingham, University of Illinois

VOLUME II — OCTOBER, 1920 — NUMBER 3

THE USE OF GROUP MENTAL TESTS IN THE GUIDANCE OF EIGHTH-GRADE AND HIGH-SCHOOL PUPILS[1]

VIRGIL E. DICKSON

Director, Bureau of Research and Guidance, Oakland, California

The purpose of this discussion is to show the use of group mental tests in the guidance of eighth-grade and high-school pupils. Tests of classroom accomplishment have shown a wide variation in the work of pupils of the same grade. Mental tests have shown that there is just as wide a variation in mental capacity. The evidence that I shall set forth in this paper tends to prove that this difference in mental capacity is one of the most important factors to be considered in the guidance and classification of children in the high school.

When the child enters the high school, he has the opportunity to elect certain courses and subjects. Very few children, however, can form judgments based upon sound principles regarding their fitness for different courses of study. Choice of subjects is more apt to be governed by popularity of instructor, ease of securing a passing grade, friendship, whim or chance, than by any serious study of the needs of the case.

GUIDANCE IS NEEDED

Pupils who go from the eighth grade to the high school are in serious need of guidance in their program making. The pupil is then making a change into a new type of school life with greater freedom, greater independence, and greater danger of being lost in the irregularity of the day's program. He is also at an age in which steady guidance and counsel are needed.

I wish to present here an illustration which will show the need for the guidance of such children.

[1] An address delivered before the National Association of Directors of Educational Research at Cleveland, Ohio, February 26, 1920.

A group mental test was given to a number of classes in Oakland. The blank used was composed of a battery of six tests, numbers 2, 3, 4, 5, 7, and 8 of the Otis Group Intelligence Scale as now published by the World Book Company. The median score for one large eighth-grade class was 109. This is higher than the median score (97) made by the combined ninth-grade classes of the city. On the contrary, the median score of another large eighth-grade class was 58. This is scarcely equal to the median score for our sixth-grade classes of the city as a whole (61). At the beginning of the next term the pupils from these two schools presented themselves to the same high school for enrollment in the ninth grade. There was practically nothing to guide the high-school enrolling committee except the fact that each pupil had a certificate of graduation from the eighth grade. The children from these two schools mingled with four hundred others from various eighth grades of the city. In almost every high-school class, children of the keenest mentality were enrolled by the side of children with the slowest and dullest minds. It is easy to picture the mental confusion of many of these pupils. In each class in the high school, some were disgusted or disinterested because the work was too slow, others were discouraged because they could not keep up and could not understand.

Group Mental Tests Are an Aid in Classification

A careful study of this eighth-grade high-school problem during the past two years has revealed the following facts:

1. That the scores from the Otis Group Intelligence Scale (given in 40 minutes) had a high correlation with the scholarship rating given by eighth-grade teachers after teaching the pupils for a whole semester.

2. That those pupils who, on completing the eighth grade, quit school to go to work had a very much lower median test score than those who went on to high school.

3. That those who went to business colleges and to vocational schools had a median test score higher than those who quit, and lower than those who went on to regular high school.

4. That those who dropped out of high school during the first year had a lower median test score than those who remained in high school for the entire year.

5. That those who made the lowest test scores were commonly among the ranks of the high-school failures in scholarship.

I have data to substantiate each of the five points mentioned above but the scope of this article will not permit me to present them here.

Capacity or Classroom Experience—Which?

By a study of age and progress data, I found that in School A, one of the large elementary schools in the best section of our city, the amount of acceleration was very nearly the same as was found in many of the schools in the poorer sections. Mental tests and tests of classroom accomplishment in reasoning, reading, etc., showed that the median score, grade for grade, in this school always stood at the top or very nearly at the top of the lists for the city.

By a study of the progress data and the mental test data for the city as a whole, it was clearly evident that each school set up standards of scholarship which varied according to the general capacity of the pupils who attended that school. This appears to me to be proper within certain limits, but there comes a time when the pupils from these schools with varying standards are thrown together into one group. Then we must know, not merely accomplishment, but also capacity to learn.

Apparently then, the high mental capacity of the pupils in general in School A was being employed somewhat in maintaining a higher standard of school work, but this superior capacity did not secure any particular advantage in the time spent by pupils in each grade.

After conference with the principal and faculty of this school, we decided, as an experiment, to segregate the pupils at the beginning of the eighth grade into two groups with a view to accelerating one group. To aid in this segregation, the six tests of the Otis series mentioned above were given to the 86 pupils entering the eighth grade in September, 1918. The names of pupils were arranged in rank order from highest to lowest according to the test score. Three teachers who had formerly taught these pupils were then asked to judge whether those near the median score should go into the accelerated group or into the regular group. This resulted in shifting a few pupils whose scores stood below the median to the accelerated class, and a few whose scores stood above the median to the regular class. As finally arranged, 46 pupils were placed in the accelerated, and 40 in the regular class.

Table I shows the distribution of the test scores for each of these groups, and Table II the distribution of chronological ages.

TABLE I. DISTRIBUTION OF OTIS SCORES FOR THE REGULAR AND ACCELERATED GROUPS AT THE BEGINNING OF THE EIGHTH GRADE

Test Score	Number of Pupils	
	Regular Group	Accelerated Group
110—114		1
105—109		7
100—104		5
95— 99		3
90— 94		3
85— 89	4	10
80— 84	1	5
75— 79	9	4
70— 74	5	3
65— 69	3	2
60— 64	4	
55— 59	5	1
50— 54	2	
45— 49	5	
40— 44	1	
35— 39	1	
30— 35		1
Total	40	46
Medians	68.3	88.5
Range of middle 50 percent of scores	56 to 77	80.5 to 102.5

There were 40 pupils in the regular and 46 in the accelerated group. The median test score in the regular group was 68; in the accelerated group, 88. The range of scores for the middle 50 percent was 56 to 77, for the accelerated class 80.5 to 102.5. There was, therefore, no overlapping of the middle 50 percent of the two groups. The median chronological age of the pupils in the regular group was 13 years, 11 months, and in the accelerated group 13 years, 2 months. Thus the accelerated pupils were on an average nine months younger than the regular group when they began the eighth grade.

TABLE II. DISTRIBUTION OF AGES FOR THE REGULAR AND ACCELERATED GROUPS AT THE BEGINNING OF THE EIGHTH GRADE

Chronological Age	Number of Pupils	
	Regular Group	Accelerated Group
16—0[a]		
15—9	2	1
15—6	2	1
15—3	1	1
15—0	3	0
14—9	1	2
14—6	2	1
14—3	4	2
14—0	4	2
13—9	4	5
13—6	8	2
13—3	2	4
13—0	4	7
12—9	0	6
12—6	3	8
12—3		2
12—0		0
11—9		1
11—6		1
Total	40	46
Medians	13-11	13-2
Range of middle 50 percent of ages	13–6 to 14–7½	12–9 to 13–11

[a] "16–0" means 16 years, no months; "15–9" means 15 years, 9 months, etc.

Both classes did good work at the beginning, but the accelerated class moved very rapidly. It gave fair promise of finishing the entire eighth grade in one semester, when, after 55 days of work, the influenza epidemic closed the schools.

At the end of the first semester, the order went forth from the superintendent's office that all classes should be regularly promoted as though the semester's work had been completed. With misgivings on our part this accelerated class—which had spent only 55 days in the eighth grade—was promoted to the high school.

At the end of the school year in May, the pupils of the regular group finished their year's work and were likewise promoted to the high school. Forty-one pupils of the accelerated group entered X High School—a large high school with more than 2,000 students—in January (spring semester), 1919. Twenty-seven out of 40 of the regular group entered the same high school in August (fall semester), 1919.

The average age difference at the beginning of the eighth grade was nine months. Therefore, upon entrance to high school, the average age of the accelerated pupils was seventeen months younger than that of the regular pupils. The accelerated pupils were thus much younger and, according to the mental test, much keener mentally than the normal pupils. All were placed in high school without the high-school faculty members knowing about the experiment. In the high school, there was no attention paid to segregation of these pupils. The members of the accelerated group have now finished two semesters of work and the regular class members, one semester.

High-School Scholarship Records

According to the general custom, all students took four regular subjects. Each should, therefore, make four credits per semester. The accelerated group made 160 credits; it should have made 164. The regular group made 104 credits; it should have made 108. Each group, therefore, made very nearly the total number of credits theoretically expected of it.

Table III shows the scholarship records for the accelerated pupils during their first and second semesters in high school.

TABLE III. HIGH-SCHOOL MARKS. ACCELERATED GROUP

School Marks	Credits, First Semester 41 Pupils		Credits, Second Semester 38 Pupils	
	Number	Percent	Number	Percent
1	27	17	21	13
2	75	47	74	48
3	51	32	50	32
4	5	3	11	7
5	2	1	0	0
Total	160	100	156	100

Table IV shows the same facts for the regular pupils during their first semester in high school. We may note certain comparisons between the accelerated and regular groups on the basis of the

TABLE IV. HIGH-SCHOOL MARKS. REGULAR GROUP. 27 PUPILS

School Marks	Credits	
	Number	Percent
1	5	5
2	44	42
3	47	45
4	7	7
5	1	1
Total	104	100

first semester's work. The accelerated group was three and one-half times as successful in earning 1's and still had 5 percent more 2's. Combining the 1's and 2's as high marks, 64 percent of the credits earned by the accelerated group were high, while only 47 percent of those earned by the regular group were high. Combining the 4's and 5's as failures, the accelerated group failed in 4 percent of its work, while the regular group failed in 8 percent of its work. In other words, the accelerated pupil made four high marks against three for the regular pupil, and the accelerated pupil had just one-half as much chance for failure as the regular pupil.

Scholarship Evidence from Another Group

Another class of fifteen pupils from School A—a class which had taken a full semester plus the 55 days in the eighth grade—entered X High School on the same day with the accelerated group described above. Many of these pupils were in the same high-school classes with the accelerated members. Table V shows their scholarship marks. A comparison of this table with Table III will further emphasize the superiority of the members of the accelerated group (judged by school marks) over the members of regular classes. The former had been selected mainly by a forty-minute mental test. They had spent only 55 days in the eighth grade and had not covered all the required work of that grade. Moreover, they were much younger than regular pupils.

This experiment gave us evidence that there was mental capacity in many a child that could easily be used to net that child

returns in acceleration without endangering his scholarship. It also indicated that superior mental capacity was a greater guarantee to good scholarship than was the mastery of all the items in the course of study of the previous grade.

TABLE V. HIGH-SCHOOL MARKS. REGULAR GROUP. (NOT TESTED)

School Marks	Credits, First Semester 15 Pupils		Credits, Second Semester 14 Pupils	
	Number	Percent	Number	Percent
1.....	1	2	2	4
2.....	24	41	23	43
3.....	27	46	21	40
4.....	2	3	5	9
5.....	5	8	2	4
Total.....	59	100	53	100

On the basis of this experiment and others of a similar kind, we are now using group mental tests extensively in the upper grades as an aid in the segregation of pupils into groups of more homogeneous mental capacity. During the past two years, 20,000 pupils in Oakland have been given the group mental test and the results are daily becoming more valuable in educational and vocational guidance.

A Superior Group and a Slow Group in High School

I shall give one other example of the use we are making of these test results. A few weeks ago, more than one hundred students presented themselves for admission into Y High School from various eighth grades of the city. The Bureau of Research furnished the principal of the Y High School with the mental test score of each of these pupils and the scholarship rating which each of them had earned in the elementary school. The enrolling committee scheduled 29 of the most superior pupils by test and by scholarship for Section A in English and algebra. These pupils were allowed three other electives. The committee scheduled fifteen of the slowest pupils by test and by scholarship for Section C in English and business arithmetic. They were encouraged to take two other electives. The rest of the pupils were scheduled in Section B.

The median test score for Section A was 109, for Section C, 58. This means to us that the pupils of Section A have a mental

capacity equal to the average tenth-grade pupil, and that Section C has a mental capacity somewhat similar to that of the average seventh-grade pupil. The median age of Section A was 13 years, 11 months; for Section C, 15 years, 7 months—an average difference of more than a year and a half.

Section A and Section C English were taught by the same teacher. Section A English moved ahead freely; the teacher could scarcely find enough work to keep the class busy. She reported: "I have to pile on the work to keep them out of mischief, and they are happy to do it." In Section C English the ordinary work was found entirely too difficult. Work was adapted to the needs of the class and all went smoothly. The pupils were happy and were working industriously. The regular teacher fell ill and a substitute teacher, who knew nothing of the segregations, took the two English classes. It was a school joke until the end of the second day, when she reported, "There must be some mistake, because all of the 'stupids' seemed to be in one class."

The teacher of Section A algebra reports: "I am doing the usual algebra work and much supplementary work. I am also covering the work more rapidly. I have absolutely no trouble with discipline and the attitude of the class is the very best. The pupils have a quick mental grasp and repetitions are seldom necessary. I am enthusiastic over the work of this group."

Section C takes business arithmetic instead of algebra. Plain arithmetic and accuracy in the four fundamentals is stressed. The class is interested and working faithfully.

An interesting incident occurred in the enrollment. By mistake a member of the committee assigned two A pupils to the C section and two C pupils to the A section. Within a week the respective teachers of these four pupils reported their names back to the office as "hopeless misfits," and the error in assignment was discovered and corrected.

I could give numerous other illustrations of class segregations of this same general character, and without a single exception the results have been highly satisfactory.

Lest I be misunderstood, however, I wish to sound this warning. We do not believe that the group mental test is an infallible guide. It is merely an important tool that can be used to advantage in the study and placement of groups and of individuals. Many

times the test score for a certain individual disagrees with that pupil's school record.

For this there are several possible reasons. A pupil may not be well when the test is given and thus fail to put forth effort; he may be stubborn and not try; he may get nervous and frightened and fail to do himself justice; he may be very slow and thus make a low score. Sometimes a pupil who makes a low score has such industry and interest in school work that he succeeds better than those who are brighter but less faithful. On the other hand, it is difficult for any pupil to make a high score without actually earning it. A pupil does not feel poorly or get rattled and thus do better work than he is ordinarily capable of doing. A high test score, however, does not necessarily mean that the pupil will do good work in school. He may be lazy, lack interest, or be in love. A dozen things may tend to interfere with his using the mental capacity he actually possesses.

The test booklet of the individual often presents facts of excellent diagnostic value. As was stated before, the test booklet which we have used most is composed of a battery of six tests. We have norms for each of these six tests. Suppose that a pupil scores well above the median in some of the tests and then "goes to pieces" apparently on one or two tests. It is clearly evident that his total test score may not be an accurate measure of his ability. Occasionally, we have a pupil who is very slow, but very accurate. This is also discernible from a careful analysis of the test booklet.

Whenever the test result does not agree with the school record of the child, further study of the case is insisted upon to see if the cause of the difference can be discovered.

Conclusion

We have found that group mental tests are a great aid in the segregation of pupils into groups according to their capacity to do school work. The greatest benefit will arise from the discovery of and more effective training of superior ability. On the other hand, however, much good will result from the discovery of the dull pupils—those who cannot reason well and for whom book work is especially difficult. When discovered, these pupils may be guided into courses and programs which fit their capacities and needs. Failure and discouragement may thus be avoided. More self-respect and better citizenship will result. Better educational guidance will naturally produce better vocational fitness for the coming worker and citizen.

EDUCATIONAL MEASUREMENT IN GRAND RAPIDS

CHARLES D. DAWSON
Assistant Superintendent of Schools, Grand Rapids, Michigan

On July 1, 1919, the board of education of Grand Rapids, Michigan created a new position of the rank of assistant superintendent of schools. The encumbent of this position was to have charge of educational tests and measurements, census and attendance, and general educational statistics. An explanation of the plan of organization and the program of work adopted may be of interest to administrative officers contemplating the introduction of a testing department in their respective school systems.

For nine years Grand Rapids has had a Binet testing department, and for five years the Courtis Standard Practice Tests in Arithmetic have been in use. A specially trained tester has administered the Binet tests, and the class teachers have given the Courtis tests. Many of the teachers have taken courses in educational measurement in normal schools, colleges, and universities.

One year prior to the creating of the new testing department, the board of education appointed the writer assistant principal of the Junior High School with a half day of teaching and a half day of experimental testing. In connection with this testing work the writer conducted two classes for training teachers of the city in educational tests and measurements. One of the courses was organized as a regular course for credit in our Junior College. It consisted of 32 two-hour formal recitations meeting once a week from four to six o'clock. At the end of the course, each successful member of the class handed in a four-thousand word thesis on the subject assigned at the beginning of the course, namely, "The Use of Standardized Tests in the Improvement of Instruction." Each of the class members paid a fee and received four hours of college credit.

The other course consisted of twenty formal recitations of one hour each. It covered the same ground as the college work but in a less thorough way. Although no credit was given for this work, each member who had attended at least 75 percent of the formal class periods received at the end of the course a certificate

entitling him to do his own standardized educational testing. The members of the college class were given the same kind of a certificate. Thus out of about four hundred and twenty-five regular grade teachers about one hundred and fifty had had some sort of training in the use of standardized tests when the work of the department began last September.

The courses which had been given the previous year were again offered in 1919–1920. The enrollment was approximately two hundred and forty. Within about five weeks these two hundred and forty individuals were started on administering tests to pupils in their own rooms. These, together with the one hundred and fifty of the previous year, gave us a force of about three hundred and ninety people competent to give and score tests, tabulate results, and figure medians, quartiles, etc. With this force, and a clerk in the director's office, the testing program was launched.

Before describing the plan in detail it should be said that the work of training the teachers for this undertaking has been a very pleasant one. They seemed to welcome the movement because it gave them a check on the accompishments of pupils' work in their respective rooms. The writer believes that the administration of standardized *educational* tests belongs rightly in the hands of teachers, and believes also that they will measure the children in their own rooms as well as or better than any stranger if only they are trained thoroughly in the work.

During the year the writer had planned to test every normal child in the entire school system from the third to the eighth grade inclusive in silent reading, fundamentals and reasoning in arithmetic, spelling, language, and writing. At Grand Rapids about nine thousand children belong to these grades. The educational tests were to be followed by a group mental test for those who did very poorly or very well, and this in turn by the Binet Test for all those who did poorly on both the educational and group mental tests. All this, however, was not accomplished and for several reasons. For one thing the program proved much too elaborate for one year. To date (March sixth) two educational tests have been given—the Cleveland-Grand Rapids Arithmetic-Survey test, and Monroe's Silent Reading test. About eleven hundred ungraded children have been given the

group mental tests, and about three hundred have been measured by the Binet tests. However, the work promises to go much faster for the remainder of the year since the organization has been improved. A special tester was secured to give part of the group mental tests, and a few teachers of ungraded rooms volunteered their services in scoring, tabulating, and reporting results.

A second cause of delay in carrying out the program has been the "Flu" epidemic. For several weeks the attendance of both teachers and pupils has been broken up so that it was advisable to discontinue the work for a while.

The teachers give and score the tests, tabulate the results, and figure medians and quartile deviation for their own rooms. Those who have had training give the tests for those who have not had training. The teachers send in a report together with each child's test paper to the director's office. Their figures are either checked in the office or by members of the writer's classes. They are then compiled by the director, and the city score is ascertained by grades, by operations, or by whatever phase of the work is important. A report is then sent to the principal of each building showing him the city results, standard scores, and the results for his own building. Principals and teachers are asked to assist in a study of deficiencies, when they are revealed, and to apply such remedies as are apparently needed.

Often measurements of this type are fruitless. Many tests are given merely from a detective standpoint—that is *to find out* without remedying. The main objectives in Grand Rapids are to classify individuals according to mental levels and accomplishments, and to stress instruction where it is needed. For several years special instruction has been provided for the subnormal and ungraded pupils, and recently provision has been made for introducing special instruction for the supernormal children. In fact classes for gifted children have been conducted in the junior high school since the fall of 1918 and recently such classes have also been organized at South High School. Some grade schools have attempted special work based on teachers' judgments alone. It is hoped that within a year there will be not only such classes organized throughout the city but that a set of records will have been obtained whereby accelerates can be properly classified.

The writer has organized a system of records whereby every child in the school system who has taken educational tests can be traced from the eighth grade to the place where he took his first standardized test, and whereby a complete record of his scores may be obtained. The same has been done for mental tests by the head of the mental testing department, Mrs. Cordelia Creswell. One may judge the character of this work of classifying children according to mental levels from a statement made by Dr. Goddard in a recent address to the effect that "Grand Rapids has made the best beginning in determining mental levels of any school in the United States." Much credit for this accomplishment belongs to Mrs. Creswell.

From the work done to date, several conclusions can be drawn:

1. If any considerable number of children are to be tested, the training of teachers in the administration of tests is the first factor of importance unless an army of trained testers and scorers can be afforded.

2. We believe it is better to have each teacher do her own testing, although one teacher from each building might be trained to do it.

3. When teachers are used as testers, the director must be a good systematizer in order to bring about uniformity of procedure.

4. No matter what system of testing one uses, the results must be rechecked and in the hands of the respective teachers within a few days after the test is given. But teachers should not wait for this. As soon as they have obtained their results they should at once set about using them without waiting for the rechecking to be done at the central office.

5. In order to obtain the greatest good from standardized tests, the principal of the building and the supervisors should be students of scientific education, so as to assist teachers in understanding results and in applying remedies.

THE SELECTION OF SILENT READING TEXTBOOKS

ERNEST HORN
State University of Iowa

In the discussions of elementary-school teachers and supervisors, no problem is more prominent than that of the improvement of the various abilities in silent reading. There are many reasons why this should be so. In the first place, the recent development of reading tests has given the problem a precision which it formerly lacked. Grade standards are gradually being worked out so that teachers now have a definite basis upon which their results may be compared with those obtained in other schools. In the second place, the recent experiments in the field of reading seem to show clearly that ability in silent reading can be surely and markedly improved. The third, and in some ways the most significant reason for the present interest in the problem, is to be found in the growing recognition that success in directing and improving the study habits of grade and high-school students depends, to a very large degree, upon the improvement of abilities in silent reading. The recognition of the intimate relation between reading and study is very important. On the one hand it helps to offset the over-emphasis upon the mere administrative factors in directed study. On the other hand it emphasizes use of reading as the means of efficient work with books.

The discussions of silent reading have commonly emphasized but two qualities, viz., speed and comprehension. But when the problem of improving ability in silent reading is viewed in its relation to the problem of improving study habits, it becomes clear that two additional qualities must be considered. One cannot leave out of account the ability to organize what is read in terms of the reader's purposes. Neither can one neglect those technics which will help to insure that what is read will be remembered.

On inquiring into the ability of a pupil to work with books we may accordingly ask four groups of questions:

1. Can he quickly locate data which he needs and read them

rapidly? This involves skill in the use of the index and the table of contents as well as ability to skim or to read rapidly.

2. Can he comprehend clearly what he has read? Has he a well-developed accuracy conscience which forbids guessing or the acceptance of hazy notions?

3. Has he the ability to find, select, and organize data so as to answer most effectively the purpose at hand? Does he recognize irrelevant data?

4. Does he understand the technics by which one can increase the amount remembered and provide for future use of the information gained?

If these four groups of abilities are accepted as representing the most important phases of silent reading, it would follow that any book which is to be used to train pupils in silent reading should either be specifically arranged to afford proper practice in exercises which have been found valuable for developing each of these abilities, or it should be easily adapted to such exercises. What should be some of the outstanding characteristics of such a book? A brief and partial list of the requirements follows:

1. It must be rich in factual and informational data. This means that the materials should be of the sort with which people *work*. Exposition, technical description, and argumentation based on concrete data—all of these are suited for exercises in silent reading. Such selections may be tested rigorously, so that any tendency to do hurried or half-baked work can be detected at once and counteracted. This is particularly important where the selection is to be used for speed exercises.

2. The content of the selections should be worth while for its own sake, well written, and scrupulously accurate. The exercises, if properly planned, should fix this valuable information in the minds of the students. Moreover, selections which are rich in content value tend to insure interest in the exercise and to guarantee practice with the kind of material which will be read in later life, while exercises containing data of no intrinsic worth produce an artificial situation and are inferior from every point of view.

3. Most of the selections should be of sufficient length to occupy the most rapid readers for several minutes. If occasional intensive paragraph study is desired, paragraphs from these

longer selections are quite as valuable, and in many ways more valuable than the isolated paragraphs. Long selections are particularly essential for exercises to develop the ability to organize. As a matter of fact, long exercises are essential to the development of any of the four abilities in silent reading which were enumerated above.

4. The silent reading text should contain some selections which are not in themselves a summary, that is, where data are given in great detail. It is not essential that this material be unorganized. Rather it should be rich in concrete material and organized on a basis different from that required in the exercise.

5. Some if not all of the selections should be preceded by a problem or problems which guide the pupil in his reading. This is especially necessary in exercises for speed and in exercises for organization. To ask a pupil merely to read rapidly, without giving him something definite to find through his rapid reading, is somewhat analogous to looking at one's feet while dancing. The actual process of reading should be in the background, the attention being centered in the problem and in the data which constitute the answer to it. Therefore, a pupil must have a purpose which will afford a criterion for the selection and organization of relevant data, and for the rejection of that which is irrelevant.

The exception to this principle is the exercise in making a digest, or the determination of the general characteristics of a selection. For such an exercise, however, the problems which introduce the selection may be ignored.

6. Each selection should be followed by appropriate tests of comprehension of the detail given in it and by tests of the ability to organize this detail. These tests must be formulated so as to test rigorously and should require no data not explicit or implied in the article. Such questions as, "What do you know about the author of this selection?" are worthless for the purposes of silent reading, and may indeed prove to be positively harmful. If they are to be included at all, it should be made clear to both teacher and pupil that the questions constitute no part of the silent reading drill. It seems much better to omit all questions which do not test the pupil's ability to comprehend, organize, or remember what he read in the selection. Occasional questions may be

asked for which the answer is: "The selection does not give data by which this question can be answered." In other words, the ability to know when a selection does not furnish relevant data is an important one.

7. The book should contain a first-class index and table of contents. Some of the selections should have paragraph and marginal headings, and some should not. These requirements, if satisfactorily met, will insure proper material for exercises in finding material rapidly through using the index, through using the table of contents, and by skimming.

8. Of course, the mechanical makeup of the book should be good. In fact, first-class printing is particularly necessary in this type of book.

One requirement not ordinarily met by texts in other subjects is desirable, i.e., the length of the selection as measured by the number of words should be indicated not only for the selection as a whole, but by paragraphs. It is possible that this information should be given at the end of the selection rather than in the margin, since in a speed exercise the appearance of numbers in the margin might prove a distraction and influence the reader to speed up his reading in a more mechanical fashion.

It is essential that there should be a good manual to accompany the exercise books. This manual should contain a pointed discussion of the problems involved in developing silent reading, and should give specific directions for teaching and testing each lesson.

What has been said implies, of course, that most literary selections are inferior for silent reading exercises of the type which characterize *work* with books. In general, the measure of good reading in literature is not so much efficiency as appreciation. The rigorous testing which is essential for the development of silent reading is impossible with most literary selections and when attempted will react unfavorably upon the appreciation of literature. In other words, both silent reading ability and literary appreciation suffer from such a practice. The literary reader will still have its place in connection with the development of literary appreciation. Literary appreciation should, however, be sharply distinguished from silent reading ability. If literary readers were to be used for the development of silent reading ability, it would

probably be better to read extensively than to subject a small number of selections to the dissecting exercises so often found in connection with the teaching of literature, or to the severe drill and rigorous testing usually found in silent reading lessons.

Until texts are prepared which satisfy the requirements laid down above, it will probably be better to depend upon textbooks and supplementary readers of the content sort, such as Keller and Bishop's *Industrial and Commercial Geography* and Chamberlain's *How We Are Fed*. These books do not, of course, contain directions for silent reading exercises, but the material in them is adapted to such exercises. Book companies might do well at this time to develop manuals of silent reading exercises to accompany the most widely used supplementary books in geography and history.

GROUPING BY STANDARDIZED TESTS FOR INSTRUCTIONAL PURPOSES

SARAH P. KETNER
Myrtle Hill School, Denver, Colorado

Scientific diagnosis of educational work and the application of remedies to fit the needs shown by such diagnosis are doing more to improve teaching than any other procedure in the school world. Most teachers work blindly, not knowing whether they are getting the results they should. When they *do* know the nature of their results and realize that the product of their teaching is unsatisfactory they do not know how to diagnose the trouble or what corrective measures to use. Usually if a teacher can diagnose the disease of an educational patient she can find a remedy which at least partially cures. Without a diagnosis, however, she hunts in a helter-skelter way for devices and methods. Having found them, she throws them indiscriminately at all the pupils, hoping that they may hit the individuals who need them.

After scientific tests have been given a class the teacher knows, in about ninety cases out of a hundred, what the trouble is. She should then place children with like needs in groups and apply the remedies which will bring each group up to standard in the point in which it is weak. Grouping children makes teaching easier and more satisfactory.

Of course, it will be argued by some that under the present school organization, this cannot be done; that it will require additions to the teaching force to handle all these groups. We grant that there is some force in such an argument, while insisting at the same time that much can be done without any radical reorganization. I shall give as proof of this an account of the work done in grouping children in reading at the Myrtle Hill School during the fall and winter last year.

We began by giving in the fourth, fifth, and sixth grades a silent reading test of our own making. Of course it was not standardized but it revealed those who read most rapidly and comprehendingly. The fourth grade was divided into two groups.

The group which read most comprehendingly and at a good rate was assigned to the regular room teacher, and I took those who fell low in their speed and in their ability to grasp thought. If there had been four or even three teachers available at that period, the better way would have been to divide the pupils into three or four groups, as follows: (1) those who read very rapidly and comprehendingly; (2) those who read comprehendingly but slowly; (3) those who read rapidly but with little comprehension; and (4) those who read neither rapidly nor comprehendingly. Since but two teachers were free, only two groups were formed. The same idea was carried out in the fifth and sixth grades, except that there we had the four groups since four teachers were available.

We were interested to find that our grouping corresponded very closely to that made after the Denver Department of Measurements and Standards had brought out the results of a city-wide use of Monroe's Silent Reading Test. This test, therefore, was the second given the Myrtle Hill pupils. Using it as a basis and taking class work into account also we redivided the pupils into more or less advanced groups. Large distribution charts were made on sign cloth; one for speed (Figure 1) and one for comprehension (Figure 2).

Each pupil after being told his score in rate and in comprehension was shown how to find his "dot," and to discover his position in regard to the standard for his grade. He was also shown how his work compared with that of his own classmates and with that of members of other classes. After these charts had been left in the classrooms for a short time, they were publicly exhibited, much to the interest of pupils, parents, and teachers.

After about four weeks' work, the Courtis Silent Reading Test was given. We found that in the fifth and sixth grades, where there had been four groups working, only three pupils fell below the standard in rate (Table I). Ten were found to have reached a stage where, according to the test, no more training was needed in either comprehension or rate. They were excused from reading as a formal study. One of the four teachers took charge of this group during the reading period, devoting the time to whatever the individuals needed most. Some worked on arithmetic, some on spelling, etc. At the close of the semester this group was given

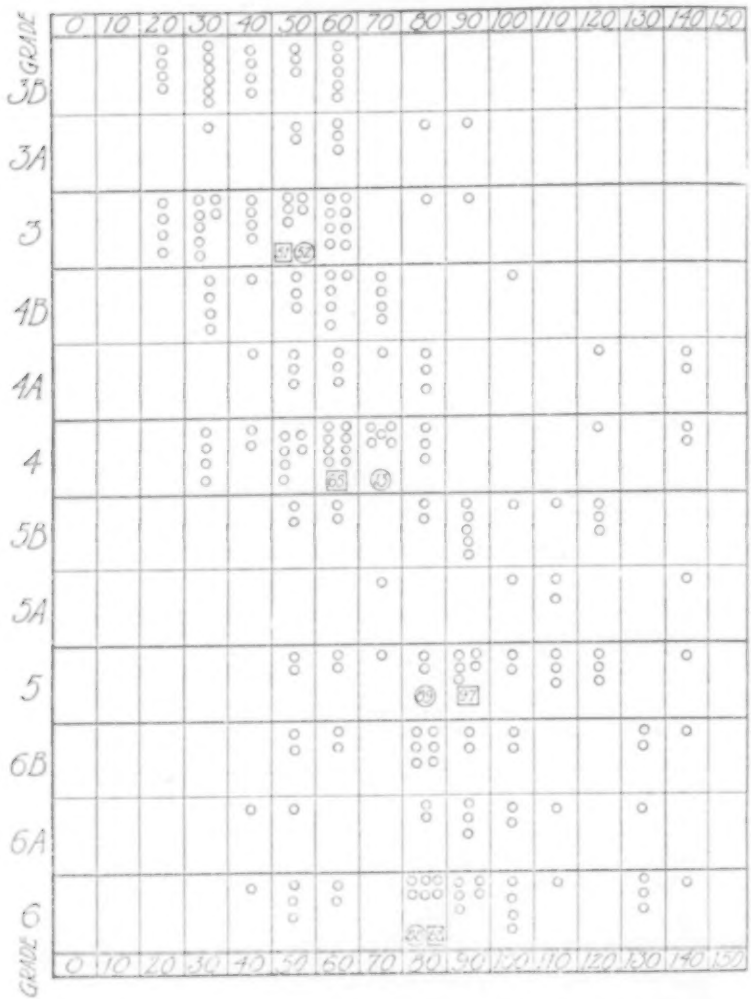

FIGURE 1. SPEED-READING DISTRIBUTION CHART. MONROE SILENT READING—MYRTLE HILL SCHOOL. STANDARD MEDIAN: ○ CLASS MEDIAN: □

FIGURE 2. COMPREHENSION-READING DISTRIBUTION CHART. MONROE SILENT READING—MYRTLE HILL SCHOOL. STANDARD MEDIAN: ○ CLASS MEDIAN: □

Fordyce's Silent Reading Test with the results shown in Table II. Nine of the eleven[1] scored 100 percent in speed and over 75 percent in quality;[2] one scored 100 percent in speed, but only 65

[1] One pupil had been added to the original ten.

[2] The proposed standards for the test are 100 percent in speed and at least 70 percent in quality.

TABLE I. DISTRIBUTION OF PUPILS ACCORDING TO INDEX OF COMPREHENSION AND NUMBER OF QUESTIONS ANSWERED (RATE)

Questions Answered	Index of Comprehension											
	Less than −5	−5 to +5	6–39	40–69	70–79	80–84	85–89	90–94	95–99	100	Total	
70												Rate satisfactory
65												
60					1		1	1	1		4	
55					2	1	1	4	4		12	
50					2	3		6	1		12	
45				1	1		2	3			7	
40				1	2	1	2	4	3	1	14	
35								1			1	Rate too slow
30			1				1				2	
25												
20												
15												
10												
5												
0												
Total			1	2	8	5	7	19	9	1	52	
	Guesswork			Comprehension poor					Comprehension satisfactory			

TABLE II. DISTRIBUTION OF THE PUPILS IN THE FIRST GROUP ACCORDING TO SPEED AND QUALITY OF SILENT READING (FORDYCE)

Quality	Speed (percents)				
	85	90	95	100	Total
100				4	4
95					
90	1			3	4
85					
80					
75				2	2
70					
65				1	1
Total	1			10	11

Class Averages: Speed 99%; Quality 89%; Efficiency 82%

percent in quality and another scored 85 percent in speed and 90 percent in quality. From this we are led to believe that it is quite possible that, after having acquired a certain standard, a pupil of a given grade may be excused from reading as a formal subject until he has reached a higher grade, where his reading is below standard for that grade.

In the second group we placed those whose index of comprehension according to the Courtis Silent Reading Test was between 90 and 94; in the third group those whose index of comprehension was between 80 and 89; and in the fourth, all those whose index of comprehension was below 80. We are now hoping that when the next test is given, no one will be below standard in speed and that the majority of each group will be ready to enter the next higher one.

It is too early to make any final deductions but we are watching with interest a number of points. Never have there been as few complaints from parents in regard to children's "marks." This may be a coincidence, but we think not. A child's "marks" when obtained in part from a standardized test, are more satisfying than they are when based on one teacher's judgment.

Though there is much labor connected with giving and following up these tests, the teachers seem to feel them worth while and do not resent them as they did at first. It is not so hard to teach pupils when they are well grouped and each pupil knows his objective. So long as they continue to see marked gain, teachers will welcome the movement and not rebel against the added work.

In my experience I have found no one thing which has done so much to motivate the work as the grouping system based on the standardized test. After we had been working for a few weeks in groups in reading, the city department sent out a test in arithmetic. The pupils asked at once whether groups were to be formed in that subject too. We have carried out the same idea in arithmetic and penmanship and hope soon to do so in other subjects.

At the suggestion of one of the teachers each instructor is going to keep a book, showing each child's score in each test, educational and intelligence, for the year. This book will be passed on with the class to the next higher grade. Every child's record for every year will thus be kept permanently. It cannot fail to be of value to the teacher and to the parent.

CURRICULUM CONTENT OF A HIGH-SCHOOL SPELLING COURSE

A. G. Capps
University of Illinois

The Scope of Investigation

Scientific methods of determining the curriculum in spelling have been based on the principles of frequency of use and of frequency of error. On the one hand frequency of use may give the content for the lower grades, although even there the arrangement of the material should be determined by a consideration not only of frequency of error but also of the difficulty of learning. On the other hand, frequency of error may serve very well in determining the directed curriculum in spelling for junior and senior high-school students. Such students have reached a stage of development that makes it practicable to disregard the principle of difficulty of learning; and the principle of frequency of use drops largely out of consideration because the students can spell from 98 to 100 percent of all the words they use.

The present study is limited to the following questions: (1) What is the technic of using the frequency of error in determining the directed curriculum in spelling for high-school students? (2) What standards of efficiency in spelling do high-school students attain? (3) Is society demanding too high standards? (4) What words with their frequency of error do high-school students misspell? (5) How does this list of words compare with a list derived on the principle of frequency of use, e.g. Ayres' Thousand Commonest Words?

This is the report of an investigation in 1914–1915 which extended over eight months of the regular session of nine months in a typical small high school of a town of 1,000 inhabitants in northern Missouri. The high-school faculty consisted of the superintendent and three assistants. About 120 students were enrolled, 25 percent of whom came from the surrounding rural schools. Spelling as a subject was not taught in the high school and the spelling taught in the town grades and in the rural schools consisted of daily lessons of ten to fifteen words, recited orally, or written, during a recitation period of five to ten minutes.

Technic of Gathering and Handling Data

The following directions for gathering and handling the data were prepared in a seminar of Professor W. W. Charters at the University of Missouri.

(a) *General Directions to Teachers*

I. Require each pupil, when he writes any school work either in school or at home, to put in the upper left-hand corner of the first page his name, the date, and the number of words in the exercise.

II. Underline in red the incorrect words in all the written work of the students. (Formal spelling lessons not included.)

III. After the usual use has been made of the papers they are to be finally returned, unfolded, to the teacher's desk and kept.

IV. The papers of each set (or assignment) are to be kept separate and arranged in strictly alphabetical order. On the top of each set place a sheet of paper on which is written the name of the course, the year (I, II, III, IV), the section (if any), the date when the assignment was written, and the teacher's name. Tie each set together without folding the papers.

V. Send these papers to the superintendent's office on Monday mornings.

VI. In the case of loose-leaf notebooks collect them once a week, and handle as other written work, except that a paper clip is to bind together the papers of any one student, and the material is to be returned to the teacher and the students as soon as the office is through with it. When notebooks are not loose leaf they are to be collected on the first and fifteenth of each month. Mistakes are to be marked and the books sent to the office. They should be returned without delay.

VII. In spelling, an abbreviation must have a period at the end; contractions must have apostrophes. Disregard hyphens, syllabication, and capital letters except that if proper nouns or adjectives are not capitalized they are to be counted as errors. In the written work of foreign-language courses count only English words. Simplified spellings should be accepted only when a pupil uses them deliberately. In mathematics the student should not count mathematical symbols among the "number of words"; he should count only full words and abbreviated words.

VIII. Immediately after having examined the first set of papers, see the person in charge of the study concerning difficulties, if there are any. Do not mark a second set until you have seen him.

IX. At the beginning of the school year but only then, students may be told about the study which is being made. They should be cautioned about always using periods after abbreviations and capital letters for proper nouns. If a student enters late he may be told these things privately.

Note: We are attempting to get at the normal spelling errors and teachers must, therefore, handle the spelling question just as they always have, giving no more attention to spelling with the class than usual.

(b) Directions for Keeping a Class Record

I. The following sample is submitted:

CLASS RECORD SHEET

Subject—English Year—1 Section—2

Name	No.	Date									
		9/29		9/30		10/3		10/4		*etc.*	
		E	W	E	W	E	W	E	W	E	W
Adams	101	6	127	6	180	3	250	4	160		
Anderson	107	2	150	1	240	2	125	5	350		
Brown	502	2	271	0	160	4	308	1	190		
etc.											

II. "Date" is that upon which the set of papers to be tabulated was written. Names of students are to be arranged in strictly alphabetical order. In the number column set down the students' numbers as described in later paragraphs.

III. In each dated column enter under "E" the number of errors and under "W" the total number of words in each paper.

IV. This record should be kept on loose-leaf, ruled paper, uniform in size for all the records. At the end of the year the teacher of each section should give a statement of the method of handling the spelling errors with the class.

(c) Directions for Making Out Error Slips

I. Errors should be copied on slips about 4 inches by 1 inch as follows:

awful 9/29 Eng. I 124
aweful

Explanation: The error is in the center; the correct spelling is in the upper left-hand corner; *9/29* refers to the date; *Eng.* refers to subject; *I* refers to Freshman course; and *124* refers to the number of the pupil, in a strictly alphabetical list according to classes—Freshman, Sophomore, Junior, Senior, and irregular students.

II. Regular Freshmen are students in the Freshman class who are spending their first year in this high school. They are to be numbered from 100 to 199. Regular Sophomores are those who have credit for a full year's work, are carrying a second full year's work, and are spending their second year in this school. They are to be numbered from 200 to 299. Juniors

similarly described are to be numbered from 300 to 399. Seniors similarly described are to be numbered from 400 to 499. All other students (called irregulars) are to be numbered from 500 on. If there are over 100 students in any group (except the last), the same definitions should be used, but other numberings should be devised.

(*d*) *Directions for the Distribution of Error Slips*

I. For preliminary distribution there should be kept five boxes, one each for regular Freshmen, regular Sophomores, regular Juniors, regular Seniors, and irregulars.

II. When the error slips have been made out and the information tabulated on the class record sheet, then the error slips should be at once thrown into the appropriate box. *Note:* This means that an irregular in a Freshman class will have his errors thrown into the box for irregulars.

III. For further distribution sort the slips in each box into 26 divisions according to the first letter of the correct spelling (as shown in the upper left-hand corner of each slip). Thus there will be an A division, a B division, etc., through the alphabet. Then arrange the slips in each division in strictly alphabetical order. Each division may then be tied into a bundle and appropriately marked for future use.

Number of Errors per Ten Thousand Words Written

From material thus obtained, a number of significant tables were derived. One of these—here presented as Table I—shows the relation between the number of errors and the number of words written. This is expressed as the number of words misspelled per ten thousand. It affords a reversed index of spelling efficiency—reversed in the sense that the less it is the greater the efficiency. Table I shows that 956,730 words were written by all the high-school students and that in writing these words the students made 3,388 errors, or 34 errors per ten thousand words written.

According to the errors per ten thousand words, the classes, arranged in descending order of ability, are Senior, Junior, Freshman, and Sophomore. The superiority of the Freshmen over Sophomores may be due to the fact that a large proportion of the written material in the freshman course in ancient history consisted of abstracts of supplementary readings—a type of writing in which few errors in spelling are likely to occur. One course common to all the classes was English, and the reversed index of efficiency is as follows: Freshman 71, Sophomore 41, Junior 32, and Senior 15. These data indicate that if this school is typical, the more advanced the class is in high school the higher its spelling efficiency is likely to be.

TABLE I. RELATION BETWEEN NUMBER OF ERRORS AND NUMBER OF WORDS WRITTEN

Class	No. of Words Written	No. of Errors	Reversed Index of Efficiency[a]
Freshman	286,700	1,142	39
Sophomore	126,629	660	52
Junior	417,864	1,281	30
Senior[b]	125,537	305	24
Total	956,730	3,388	34

[a] Reversed index of efficiency is 10,000 times the number of errors divided by the number of words written. Instead of being percent of errors or number of words misspelled per hundred, it is the number misspelled per ten thousand.

[b] If the written work from the shorthand course is omitted—a course in which there are acually students from all classes—the entries in Table I for seniors would be: No. of words written, 119,010; No. of errors, 242; index of efficiency, 20.

Standards of Efficiency

One of the factors to be considered in curriculum construction is the demands made by society in general. This is particularly true in the case of spelling and fortunately for the schools the standard is clearly defined. In this field there is practically no place for originality. If the stenographer makes one error in spelling in a note of a half dozen words or in a letter of three or four pages, the error must be corrected because the employer knows that the receiver of the letter will be surely prejudiced against the sender if every word is not spelled correctly. The advertising manager exercises great care to see that all words in his copy are correctly spelled, because he knows that one spelling error will detract from the efficiency of his selling talk. Any number of such illustrations could be obtained from various fields of social activity. The preceding discussion may be stated quantitatively by saying that society demands 100 percent efficiency in spelling.

How do these students measure up to the standard of efficiency demanded by society? In order to answer this question the number of words written by each pupil and the number of errors he made were tabulated. Next the average number of words written per page was determined by averaging a random sampling of pages. It was found that the students wrote about 150 words to the page. The number of words written by each pupil

divided by 150 gives approximately the number of pages written by him. The numbers of errors per page may then be found by dividing the total number of errors by the number of pages. Thus Table II was derived. Data are given only for pupils who wrote 5,000 or more words.

TABLE II. DISTRIBUTION OF PUPILS ACCORDING TO THE NUMBER OF ERRORS PER PAGE

Errors per Page	Number of Pupils
0	10
0.10	11
0.20	10
0.30	5
0.40	7
0.50	11
0.60	8
0.70	4
0.80	4
0.90	4
1.00	2
1.10	1
1.20	2
1.30	2
1.40	0
1.50	1
1.60	0
1.70	0
1.80	2
1.90	2
2.00	0
2.10	1
Total	88
Median	0.51
Average	0.56
25-percentile	0.21
75-percentile	0.80

The table should be read as follows: ten pupils made zero to 0.099 errors per page; eleven pupils made from 0.10 to 0.199 errors per page; ten pupils made from 0.20 to 0.299 errors per page; etc.

The significance of the table will be more easily grasped if the reader will remember that 0.10 errors per page means that on ten pages of written material one word was misspelled, or that one word in 1,500 was misspelled; that 0.20 errors per page means that on ten pages of written material two words were misspelled, or that two words in 1,500 were misspelled.

The median number of errors per page was 0.51 or one misspelled word for every two pages of written material. This means that half the students spelled better than this and that half of them spelled worse. The 25-percentile of errors per page was 0.21. This means that one-fourth of the pupils in the high school misspelled less than 2.1 words on ten pages. The 75-percentile indicates that three-fourths of the pupils made less than 8 errors on ten pages.

We may consider these figures in relation to the standards in spelling demanded by society. Perhaps the 25 percent of the pupils who misspelled less than two words on ten pages of written material would be called *good* spellers by society at large—we are not sure that they would not be called *excellent* spellers. How high a percent of accuracy does this standard call for? Two words misspelled in 1,500 would give a misspelling of approximately one-tenth of one percent or a standard of excellence of 99.9 percent. The fact that 75 percent of the pupils misspelled less than eight words on ten pages means, approximately, that they misspelled less than one-half of one percent of their written words. That is, three-fourths of the students reached a standard of at least 99.5 percent. Table II shows that the poorest speller averaged 2.9 misspelled words to the page or to 150 words written. This pupil misspelled approximately 2 percent of the words he used and his percent of accuracy was therefore 98.

There is no doubt whatever but that society would consider the poorest speller, the student whose standard of efficiency was 98 percent, unfit for any position in life demanding spelling. Yet, the merchant is considered an excellent collector if 96 percent of his outstanding bills are paid; the good doctor does not expect to cure all his patients; the good lawyer does not win all his cases; and the morally good man is excused if he fails to live up to his standards at all times. In what human affairs does society condemn an approach to perfection which is represented

by 98 percent? Are not the social objectives in spelling instruction too high?

Summary of Misspelled Words

In the following summary of words misspelled by the high-school students, the figures in parentheses in the first paragraph indicate the frequency of error. The words preceded by an asterisk are those of the high-school list that are also found in Ayres' Thousand Commonest Words. Only the words misspelled three or more times are given.

Misspelled 10 or more times—parliament (92), *too (47), *until (31), quantity (25), *their (23), vassal (22), *there (21), *government (21), *separate (19), *finally (19), *they (18), straight (16), didn't (16), *water (15), Bibles (15), council (14), growth (13), iodine (13), *coming (13), *lose (13), isosceles (12), *disappointed (11), perpendicular (11), quantities (11), Delaware (11), *to (11), *and (10). Christians (10). *Total 28.*

Misspelled 9 times—*business, color, emetic, *especially, Jews, loans, proteins, *religion, *through. *Total 9.*

Misspelled 8 times—*beginning, generally, *height, succeeded, usually, writing. *Total 6.*

Misspelled 7 times—addressed, ammonia, apothem, chronicle, equivalent, loses, monastery, *people, perimeter, *together, *whether. *Total 11.*

Misspelled 6 times—alcohol, all right, colleague, *divide, enemies, hydrochloric, Indian, *knew, *off, proteids, suspense, systematizes, tried, *volume. *Total 14.*

Misspelled 5 times—*always, apparatus, *believe, bequeathed, centigrade, carriage, carrying, clothes, developments, disappeared, exhausted, Gracchus, heretics, immediately, monasteries, naturally, *new, *piece, *principal, thoroughly, *thought, tournament. *Total 22.*

Misspelled 4 times—*although, ancestors, appearance,* because, belief, *born, closely, completely, compliment, conscience, conquer, conqueror, different, disappears, divine, duchess, exhausted, expedition, feeling, *fourth, hopeless, horny, knot, major, *meet, milliner, misshapen, *money, *pleasant, privilege, procedure, prophecy, receiving, restaurant, *school, spadille, spear, successful, *surprise, teaspoonful, testament, *very, warriors, zinc. *Total 44.*

Misspelled 3 times—abbess, accompanied, *against, aluminum, architecture, arrived, assassins, Antonines, awoke, baptism, *became, *behind, Bob's, buoyed, *by, calendar, cherry, choked, Christianity, comedies, committed, cooky, couldn't, crystals, cylindrical, depth, descendants, disappear, divided, drawer, dried, embryo, existence, Flodden, followed, gas, grease, grew, Hadrian, Hallowe'en, Haynes, hereditary, *him, *his, honorable, horizon, imitation, independent, indulgences, *instead, interesting, *judgment, knowledge, lavender, level, losing, ma'am, Manila, *materials, *minutes,

mountainous, *necessary, needed, oats, *of, ones, *opinion, oxen, parallelogram, peace, peaceful, petit, physical, porous, preference, primly, *principle, proof, Protestants, *quite, rectangle, re-enter, retired, scourged, separated, separation, servants, shepherdess, Silas, similarity, skates, succeed, *suppose, tutors, unfortunately, village, *which, *whole, workman. *Total 99.*

A count of the different words in the list gives a total of 233 words misspelled. It should be kept in mind that this list shows only the words that were misspelled three or more times. There were in all, however, 1,925 different words misspelled by the pupils of this high school during the eight months of the study. Evidently, therefore, 1,692 different words were misspelled either once or twice.

There were 28 different words that were misspelled ten or more times. The repeated misspelling of these words totaled 553 errors or 16 percent of all the errors made. There were 62 different words that were misspelled five to nine times inclusive. These were misspelled 400 times. There were 44 words that were misspelled four times, totaling 176 errors; and 99 that were misspelled three times, totaling 297 errors. The total number of errors for words misspelled three or more times was 1,426, or 42 percent of the entire number of errors.

Proper Names and Technical Words

Looking over the list of words misspelled three or more times one finds scattered through it certain proper names and technical words. There were 14 proper names and they contributed 68 misspellings. One does not have a definite criterion for determining technical words, but 17 words were so considered. These yielded 217 errors. Thus proper names and technical words, amounting together to 31 different words, accounted for 285 errors. Recalling that there are only 233 different words in the list, and 1,426 misspellings, one sees that 13 percent of the list and 20 percent of the errors are represented by proper names and technical words. Hence, much of the time devoted to corrective work in high-school spelling in this school should be on technical words and proper names.

Comparison with Ayres' Thousand Commonest Words

Comparing the words in our list with those in Ayres' Thousand Commonest Words one finds that 62 words in the former are in the

latter. These 62 words were misspelled 497 times by the high-school students. There were 1,141 errors made by the high-school pupils in spelling non-technical words (only words misspelled three or more times are reported) and there were 202 such words. Sixty-two (or 31 percent) of the non-technical-error words are found in Ayres' list. These 62 words were misspelled 497 times constituting 44 percent of the errors.

From the viewpoint of curriculum construction these data indicate roughly the relative emphasis to be placed in this school on the commonest words and on the words that are special to the high-school curriculum. That is, approximately 44 percent of the directed spelling curriculum should consist of commonest words such as are found in Ayres' list and the remaining 56 percent should consist of words special to the high-school curriculum.

Conclusions

From the standpoint of curriculum construction the word list gives only the needs for the pupils of this high school and similar studies will have to be made before other than a tentative list can be obtained for high schools in general. The technic of investigation is simple and requires only patience on the part of investigators. In fact, the procedure is so simple and straightforward that any high-school faculty can make up a list of words suited to its local needs.

There is no reason to believe that the students in this high school were above the average in spelling, and the study shows that the range of efficiency from the poorest to the best was from 98 to 99.9+ percent. Numerically this is a narrow range, yet so delicate are our sensibilities concerning spelling that it is practically very wide. It includes records of almost every degree of merit to be found in the high school, from the intolerably bad to the altogether satisfactory. A consideration of such facts raises the question of whether the spelling standards set up by society are not arbitrarily and unreasonably high.

A COMPARATIVE STUDY, BY EDUCATIONAL MEASUREMENTS, OF ONE-ROOM RURAL-SCHOOL CHILDREN AND CITY-SCHOOL CHILDREN

J. Crosby Chapman
Yale University
AND
H. L. Eby
University of California

The Nature of the Problem

A great deal has been written on the relative advantages of rural and city schools. Certain merits of the former have been emphasized in what at times appears to be an attempt to prove that the individual instruction of the ungraded school compensates for the greater proportion of time spent in teaching and the general superiority of instruction in the city school. However great may be the desire to establish the claim that there is equality of opportunity for pupils of both schools, the only proof of it rests upon a careful comparison of the work of typical schools of each group.

For the purposes of this study we have tried to secure typical conditions, and we believe that the results, while strictly true only for the particular groups measured under the conditions of the experiment, give, unless contrary evidence is obtained, some tentative quantitative answers to questions of great educational significance.

Selection of Subjects

In order to simplify the work only children between the ages of 11 years and 13 years, 11 months were examined. By the time pupils have reached this lower age limit, they have spent about five years in school. During this period differences in the environment of rural and city schools have had time to produce their results.

The upper limiting age was placed at 13 years, 11 months because of the possibly unequal effect of elimination in city and country schools among children beyond that age. It would have been much more advantageous to use age limits one year apart.

It was impossible, however, to secure 50 to 70 children between such narrow limits without increasing enormously the otherwise rather serious traveling factor.

The nature of the selection of each group is as follows:

The One-Room Rural-School Group

1. Boys and girls.
2. Age: 11 years, 0 months to 13 years, 11 months.
3. Selected from one-room, one-teacher rural schools in northern Ohio.
4. Examined in groups, varying from two to eight.

The City-School Group

1. Boys and girls.
2. Age: 11 years, 0 months to 13 years, 11 months.
3. Selected at random from a city school of average standing, as shown by a recent survey in the city of Cleveland.
4. Examined in a single group.

About fifteen one-room, one-teacher rural schools in northern Ohio were visited. Within each one of these schools every pupil between the ages of 11 years, 0 months and 13 years, 11 months was selected. The possibility that dull children within these age limits might be withheld by the teacher from examination was carefully guarded against. The children of each school were assembled as a group and given the tests under as nearly identical conditions as the changing situations would allow. School after school was visited until 71 pupils had been tested.

One of the large city schools, situated in an average social environment, which had been shown by a recent survey to be of about average standing as compared with the other schools of the city, was chosen to furnish the groups of city-school children. The authors were supplied from the school records with the name of each child whose age fell between 11 years and 13 years, 11 months. These names were then written on small pieces of paper and assembled according to ages. Only 58 of them could be used because the examination room would accommodate no more than that number. From each age-group enough names were drawn at random to make the proportion of children of each age approximately the same in the city and rural groups. The sexes were also equally balanced in the two groups.

It is perhaps well to repeat that no claim is made that either the 71 rural-school children or the 58 city-school children can be taken as typical rural-school children or city-school children

respectively, throughout the country. It is claimed, however, that until similar studies have been made in other places and the results of these studies combined, the present research gives some evidence upon which important decisions may be based.

Preliminary Record Card

Each pupil, before beginning the test, was asked to fill out an information blank calling for the following data: name, age, grade, school, number of schools attended apart from the present one, nature of school (whether town or village, with name of city or village), and age of entering school. This blank was studied in order to determine the suitability of the child as a member of one or the other group. Children who had spent half-time in rural schools and half-time in city schools were rejected. Those who had spent the last four or five years in one type of school were selected to proceed with the examination.

Nature of Tests and Method of Administration

The following is an account of the tests used in the order in which they were given, including, when necessary, comment on the method of administration and scoring

Cancellation. Woodworth-Wells sheet. Examples shown on board· Cancel 3's. Time 90 seconds. Basis of scoring, number of correct cancellations.

Substitution. Whipple digit-symbol sheet. Examples shown on board. Time 5 minutes. Basis of scoring, number of correct substitutions.

Addition. Thorndike sheets. Time 10 minutes. Basis of scoring, number of correct additions.

Opposites. A list of forty words taken from Woodworth and Wells. Examples shown on board. Time 90 seconds. Basis of scoring, number of correct opposites written.

Hard directions. Woodworth-Wells hard directions test. Similar passage was shown on board. Time 2 minutes. Basis of scoring, one point for each correct response. Where nothing was required to be done, a blank was counted as correct, provided the subject had passed the point.

Spelling. Starch spelling list (100 words). Words dictated. Time unlimited. Basis of scoring, number of correct spellings.

Composition. Theme on which writing was to be done: "The happiest or most interesting day of my life, where I was and what I did." Time 5 minutes without pencils to think, and then 10 minutes for writing. Basis of scoring, the average grade, on the Hillegas scale, given by twenty undergraduates in the Education Department.

Handwriting. The compositions written above, where no mention had been made of handwriting, were graded on the Thorndike scale by twenty undergraduates in the Education Department; the average grade determined the score.

Information. A special list[1] of 50 words, selected after experimentation by the authors, to test a wide range of information for children of ages 11 to 13, so chosen as, on the average, not to give undue advantage to either city- or rural-school children. Examples were given on the board and the pupils were told to write a word or sentence to show that they knew what the word meant. No pronouncing of words was allowed. Time 20 minutes. Basis of scoring, one point for each correct response. In all cases where doubt existed as to the correctness of the response, the subject was given the benefit of doubt.

Courtis Arithmetic, Series A, Fundamentals. Place for rough work explained. Time 12 minutes. Basis of scoring, one for each correct answer. (The results for part of this test were lost, for which reason no account is given of the work with it.)

In all cases the sheets were distributed face down and the greatest care was taken to see that all the pupils began and finished together. The same examiner conducted the tests on the various groups of rural children as well as on the city group. The same explanation was given to all groups, and the time devoted to explanation was the same.

Owing to the fact that this study was completed in the summer of 1916, some of the tests and methods may appear rather archaic. Were the experiment to be repeated, it is obvious that a reliable group intelligence test combined with a composite school test would be much more advantageous than the tests that were actually applied. At the time when this research was initiated, however, this group of tests—which was being given in another experiment—happened to be ready for use; and it was applied to this problem. The general idea of the selection was to use some

[1] The following words constituted the final list:

quinine	peninsula	submarine	canyon	sleigh
etiquette	luncheon	campaign	million	quotient
missionary	physician	stanza	microbe	ore
politics	Genesis	candidate	jury	settee
percentage	elevator	guitar	abdomen	temperature
Longfellow	census	massacre	patriotism	assembly
dine	quadruped	eclipse	wigwam	Galilee
ammunition	traitor	agitate	Eskimo	ventilation
Shakespeare	avoirdupois	locomotive	corpse	tonsils
prodigal son	glacier	volcano	equinox	tariff

tests, such as *composition* and *addition*, which measure abilities dependent very largely on educational facilities; and to use other tests, such as *substitution*, *cancellation*, *opposites*, etc., success in which would be only indirectly a function of the educational environment.

Presentation and Interpretation of Results

Before attempting to consider the statistical results of the application of these tests, it will be well to raise a question, which underlies the major portion of the interpretation of the data.

Taking the two groups of children, rural and city, to what extent are group differences in achievement due to differences in native intelligence, to differences in home and general out-of-school life, or to differences in school environment? To disentangle these three causes and to assign weights to each is impossible. In the opinion of the authors, what true differences are found must be ascribed chiefly to the third factor. There are probably slight differences in native intelligence, due to the selective influence of the city, etc.; but these differences would certainly not be sufficient to produce the effects shown. Moreover, from internal evidence the tests themselves show that those differences in the two groups which can be assigned to native intelligence and general home conditions are slight. This evidence is obtained by considering the differences in the achievement of the rural and city children in (1) tests which are largely independent of school training, and (2) tests which are largely dependent on school training. Later it will be shown that in the former group of tests there are but slight differences, while in the tests dependent on school training the groups show great differences in achievement.

Whatever opinion there may be as to the causes of differences between the two groups, or as to the weights to be given to native intelligence and environment, this study is justified in that it presents a somewhat detailed comparison of the two groups as they actually existed in a fairly typical state situation. There is no reason to suppose that the rural or city schools in Ohio are much better or worse than those found in large numbers of other states. Even where the state level of education is decidedly better or decidedly worse, it is more than likely that the ratio of

rural-school efficiency to city-school efficiency, upon which this study is based, is fairly constant.

In view of the small number of children in each of the age groups, particularly the thirteen-year-old group, great care must be taken not to press the results beyond the limits which their accuracy permits. While it is true that each individual figure is somewhat unreliable, it is possible to obtain fairly reliable estimates of certain large effects by compounding several results.

Table I shows the distribution by grades of the various age groups. The median grades of the different age groups of rural and city children do not indicate that, as regards the actual grade, whatever that may mean, there is much difference between the rural and city children. Average children of a particular age in the one-room rural schools were about half a grade behind children of the same age in the city school. Seeing that grades mean so little and that the schools are still using the deadening "promotion by age" system, this difference may or may not be significant.

TABLE I. DISTRIBUTION BY GRADE OF THE VARIOUS AGE GROUPS

Grade	11 Years		12 Years		13 Years	
	Rural	City	Rural	City	Rural	City
I	1	.....	.....	.....	.....	.....
II	.....	.....	.....	.....	.....	.....
III	3	.....	2	.....	1	.....
IV	7	4	5	5	.....	1
V	11	12	7	1	1	1
VI	5	4	10	10	8	2
VII	.....	4	4	3	4	3
VIII	.....	.....	.....	2	2	3
Total.....	27	24	28	21	16	10
Median Grade.	5.2	5.7	6.0	6.5	6.8	7.3

If the grade of pupils were an indication of achievement which was constant from school to school, the study could stop here, the conclusion being that the rural school children are on the average half a grade behind city school children of the same age. There is, however, little equivalence between grade standings within the

same school system, and the equivalence from school to school—particularly among rural schools where teachers change so rapidly—becomes of such small value as to be of no service in interpreting a difference as small as half a grade.

The attainments of the two groups, therefore, are compared for all the tests by statements of (1) the median performance of each age group (rural and city); (2) the median performance of one-room rural-school children translated into percents of the median performance of city-school children of same age; and (3) the percent of one-room rural children of each age equalling or exceeding in performance median city-school children of the same age. These statements constitute Tables II, III, and IV respectively. The reader will observe that in Table III figures in the region of 100 mean that the performances of rural and city children were about the same. Figures less than 100 indicate that the rural children did not do as well as the city children, and figures over 100 indicate that they did better. In Table IV an entry of 50 or thereabouts indicates equality of achievement as between the two groups of children, one of less than 50 that the achievement of rural children was inferior, and one of over 50 that it was superior.

TABLE II. MEDIAN SCORES

Tests	11 Years		12 Years		13 Years	
	Rural	City	Rural	City	Rural	City
Cancellation	42.5	38.6	45.6	42.9	45.0	47.5
Substitution	79.3	73.3	78.9	79.3	90.0	76.7
Opposites	15.8	15.6	19.1	19.1	23.3	24.0
Spelling	60.5	58.3	65.8	68.1	67.5	76.7
Handwriting	8.6	10.2	9.1	10.3	10.4	10.3
Information	13.1	23.8	20.0	30.8	32.0	32.5
Addition	8.7	20.0	11.0	20.5	16.2	22.0
Composition	32.5	45.0	41.0	48.5	43.0	52.5
Hard Directions	6.1	8.0	6.6	10.8	6.8	9.3

A study of Tables II, III, and IV will show that we may assume a practical equality of performance in the following tests: *cancellation*, *substitution*, *opposites*, *spelling*. A distinct superiority of the city-school children, amounting to at least a year, was

TABLE III. PERFORMANCES OF RURAL-SCHOOL CHILDREN AS PERCENTS OF THE PERFORMANCES OF CITY-SCHOOL CHILDREN OF THE SAME AGE

Test	11 Years	12 Years	13 Years	Average 11, 12, 13
Cancellation	110	106	95	104
Substitution	108	100	116	108
Opposites	101	100	97	99
Spelling	104	97	88	96
Handwriting	84	88	101	91
Information	55	65	98	73
Addition	44	53	74	57
Composition	72	85	82	80
Hard Directions	76	61	73	70

Table reads: In the cancellation test the performance of 11-year-old rural children was 110 percent of that of the city children of the same age; the performance of 12-year-old rural children was 106 percent of that of city children of the same age, etc.

TABLE IV. PERCENT OF RURAL-SCHOOL CHILDREN EQUALLING OR EXCEEDING IN PERFORMANCE MEDIAN CITY-SCHOOL CHILDREN OF THE SAME AGE

Test	11 Years	12 Years	13 Years	Average 11, 12, 13
Cancellation	60	55	50	55
Substitution	63	49	63	58
Opposites	50	50	44	48
Spelling	53	41	29	41
Handwriting	23	25	56	35
Information	27	20	50	32
Addition	11	5	23	13
Composition	22	14	9	15
Hard Directions	26	10	15	17

Table reads: In the cancellation test, of the 11-year-old rural children 60 percent equalled or surpassed the median city child of the same age; of the 12-year-old rural children 55 percent equalled or surpassed the median city child of the same age; etc.

shown in *writing* and *information*. A very great superiority of the city-school children appeared in the remaining tests: *addition*, *composition*, and *hard directions*. The rural-school children were at least two years to two and one-half years behind the city-school children in these tests.

Assuming as several studies have shown, that spelling ability is largely independent of instruction, the first group of tests may be said to measure power in traits independent of school training. As revealed by tests of this sort, little differences between the attainments of city and rural children were found. According to the second group of tests embracing *writing* and *information*, which are more dependent on instruction, the city-school children were distinctly superior to the rural-school children. In the third group of tests, abilities which, at least as far as *addition* and *composition* are concerned, are almost wholly a product of school training, there was a very large difference in favor of the city-school children. It is difficult to classify the *hard directions* test. While it may appear to be a test of general intelligence and therefore to belong in the first group where equality of attainment is found, from another standpoint it measures the power to perform simple tasks in accordance with directions given—a power in which children who have been trained by superior teaching would naturally be in a better position to score. Moreover, children in graded schools are more accustomed to following oral and written directions without individual explanations than are rural-school children. The latter are more likely to receive personal attention when tasks are allotted or instructions are to be followed. Although it is impossible to substantiate the claim, it appears to the authors that the performance in this test would be largely a function of school training. If this assumption is made, we may conclude for the whole group of tests that the superiority of the city-school children over the one-room rural-school children varied approximately in direct proportion as the demands made by the test called for specific school instruction as opposed to general powers which the school can do little to make or mar.

The poor performance of the rural children in certain of the specific school tests tempted the authors, at the beginning of the study, to assume that the rural children for one reason or another were not willing to cooperate in the experiment. Later, however, when the performances in tests largely independent of school training were determined, the hypothesis had to be abandoned. In all probability, the great differences revealed are general indications of the median powers of the two groups. It would be interesting to investigate the point, upon which this study can throw

no light, as to the true causes of these differences. To what extent was the inferior performance of these rural children—which far exceeded any possible factor of intelligence selection in favor of city-school children—caused by (1) the administrative methods of the school (absence of competition, short hours of instruction, etc.) and by (2) inferior teacher material?

Variability among the Rural and City Children

The absence of large groups prevents detailed treatment of the variabilities of the two groups in each of the tests. It is, however, possible by combining results to get fairly reliable conclusions. The Pearson Coefficient of Variation, using the formula $\frac{100\left(\frac{Q_3-Q_1}{2}\right)}{M}$ has been worked out for each test for each age group of rural- and city-school children. Averaging these results for substitution, opposites, spelling, and cancellation which are largely independent of school training, the data of Table V result.

TABLE V. COEFFICIENTS OF VARIATION FOR TESTS LARGELY INDEPENDENT OF SCHOOL TRAINING

Age	Rural	City
11	22	17
12	15	14
13	21	16

For the remainder of the tests which are increasingly dependent on school training the corresponding figures are entered in Table VI:

TABLE VI. COEFFICIENTS OF VARIATION FOR TESTS LARGELY INFLUENCED BY SCHOOL TRAINING

Age	Rural	City
11	40	20
12	33	23
13	23	22

From these figures comment may be offered as follows: (1) The rural-school children vary slightly more than the city-school

children in tests independent of school training, and decidedly more in those dependent on school training. (2) In the tests dependent on school work children of both groups show greater variability than they do in the tests independent of schooling. (3) As we pass from the eleven-year-old groups to the thirteen-year-old groups, the variability alters very little among the city children; but there is considerable reduction in the rural-school variability especially in those abilities which depend on school instruction. This suggests that the rural school has not had time until children have reached thirteen years of age to exert the leveling effect which has demonstrated itself by the age of eleven years in the city school.

The results of this study are in accord with some recently published findings of the Virginia Education Commission. In a sampling of the entire school population which was given standardized tests, it was indicated that the one-room rural-school children showed decided deficiency in reading and in handwriting, and that in the use of arithmetical processes they were at least one and one-half grades behind the children of the city schools. In fact, in the summary the Commission suggests that the somewhat low performance of the Virginia school children was due, among other factors, to "the large number of one-room schools."

Summary

An unselected group of 71 children from one-room one-teacher rural schools, ages distributed from 11 to 13 years, in northern Ohio, was compared with a similar group of children in an average large city (Cleveland) school by administering nine psychological and educational tests.

In the tests of abilities which are relatively independent of school training—namely, *cancellation*, *substitution*, *opposites*, and *spelling*, there were but small differences in the attainments of the two groups; but in the remainder of the tests—namely *writing*, *information*, *addition*, *hard directions*, and *composition*—the rural children were notably inferior. The inferiority seems to be directly proportional to the extent that the tested function is complex and school-conditioned. In *addition* and *composition* the inferiority was that of two to two and one-half years.

The variability of rural-school children was slightly greater than that of city-school children in tests independent of school training and much greater in tests dependent on school training.

COMMON SCHOOL FINANCE IN COLORADO AND CERTAIN INFERENCES OF NATIONAL IMPORT*

FLETCHER HARPER SWIFT
University of Minnesota

INTRODUCTION: EXISTING INEQUALITIES OF EDUCATIONAL OPPORTUNITY IN THE UNITED STATES

Throughout the United States, as throughout the world at large, no demand is more insistent, more loudly voiced, more significant today than the demand that education be universalized. It may be startling, but it is nevertheless true, that at the present moment education in the United States is neither universal, democratic, nor free.[1]

In the year 1914–1915 a child living in Massachusetts would probably have attended school 157 days during the year, would have been taught by a teacher receiving an annual salary of over $800, and would have had $53 expended upon his education.[2] If, on the other hand, he were living in Alabama, and if he were fortunate enough to belong to the 63 percent of the children enrolled in school, he probably would have attended school 79 days, would have been taught by a teacher receiving an annual salary of $345, and during the year would have had $16.06 expended upon his education.

In Alabama the average length of the school year in rural communities is 110 days, in urban communities 176 days; 50 percent of the white children attend school, and only 29 percent of the negro children. There is on the average in this state one teacher for every 53 white children, but only one for every 130 negro children.[3] In Colorado, the state in which the chief interest of the present article lies, first- and second-class districts pay on

* The present study will constitute one of a series in a forthcoming monograph entitled, *Studies in public school finance in the United States*.

[1] That the schools of Alabama for example are not free is shown by the fact that in an appreciable portion of the districts, revenue is derived from fees required of students and from the gifts of patrons. In the year 1916–1917, $484,054 was derived from these sources. See *Alabama department of education annual report*, 1917, p. 133.

[2] *United States commissioner of education report*, 1917, 2:45, 48, 50, 55.

[3] *Alabama department of education annual report*, 1917, pp. 23–26.

the average from two to four times as high a rate of school tax as do third-class districts.[4]

At no time in the history of our republic has there been a wider realization that education is not, but must be, universalized and democratized; and that such democratization involves at least two processes: (1) reorganization of our course of study, educational institutions and systems, including political school units; and (2) the distribution of vastly increased expenditures for schools in accordance with scientific methods.

The Educational Situation in Colorado

Colorado ranked (in the year 1918) nineteenth in the Union with respect to total valuation, eleventh in annual school expenditure per capita of average attendance, twelfth in average annual salary of teachers, and tenth in percent of children of school age enrolled in school. As one of the last states to be admitted into the Union,[5] she had the opportunity of profiting by the experience of the older states. The sixteenth and thirty-sixth section lands granted her upon admission to the Union for the use of the common schools totaled approximately 3,712,307 acres,[6] an area greater than that of the entire state of Connecticut. Whereas many of the states early disposed of their school lands, Colorado realized from the very beginning the folly of such a policy and today still retains the greater part of her school-land empire. Before entering upon a study of Colorado's system of common school support, it will be well to endeavor to gain some conception of her general educational situation. This can be most easily and quickly done by presenting tabularly certain significant data. Table I, which follows, attempts to show:

1. The conditions with which the school system has to deal.
2. The financial support given by the state to the efforts of the schools.
3. The results of the interaction of 1 and 2, as seen in enrollment, attendance, length of school year, illiteracy, and teachers' average wage.

Defects, attendance and enrollment.—Table I shows us that whereas in 1918 Colorado ranked eleventh in annual expenditure

[4] Sargent, C. G. *Rural and village schools of Colorado*, pp. 47, 63.

[5] Admitted in 1876. Only ten states were admitted later, namely: (1) North Dakota, (2) South Dakota, (3) Montana, (4) Washington, (5) Idaho, (6) Wyoming, (7) Utah, (8) Oklahoma, (9) Arizona, (10) New Mexico.

[6] *Colorado state land commissioners' report*, 1917–1918, p. 86.

TABLE I. FACTORS IN THE EDUCATIONAL SITUATION OF COLORADO IN 1918[a]

A. Conditions	Size of Item	Rank in Union(b)
I. Total Gross Area(c) ..... sq.mi.	103,948	7
II. Population		
1. Density(d) (1910), Popula'n per sq. mi.	7.7	40
2. Total(e) (U. S. Census estimate)	1,014,581	32
3. Percent white(f) (1910)	98.0	16
4. Percent negro(f) (1910)	1.4	28.5
5. Percent foreign born white(f) (1910)	15.9	21
6. Percent rural(g) (1910)	49.3	35
7. Percent urban(g) (1910)	50.7	15
8. School population (est. 5-18 yrs.)(h)	237,407.0	33
9. Percent of population over 10 years of age which is illiterate(i) (1910)	3.7	17.5
III. Estimated True Value of All Property of State (1912)		
1. Total(j)	$2,386,923,583.0	19
2. Taxable(j)	$2,286,478,777.0	20
B. Support		
I. Annual Current Expenditures for Public Schools		
1. Total(k)	$8,093,598.0	22
2. Per capita of average attendance(l)	$58.65	11
II. Total Expenditure for Schools on Each $100 of Estimated Taxable Wealth(j) (1912)	$0.285	23
III. Percent Total Levy for Schools is of Total Taxation for All Purposes(m) (1912)	38.84	8
C. Results		
I. Number of Children of All Ages Enrolled(n)	200,763.0	32
II. Percent of Children of School Age (5-18 Years) Enrolled(o)	84.6	10
III. Percent of Children Enrolled in Daily Attendance(p)	68.7	35
IV. Average Length of School Year in Days(q)	168.0	23.5
V. Average Annual Salary of All Teachers(r)	$749.0	12

a All data are for 1917–1918 unless otherwise specified, and are taken from federal reports which, though far from accurate, are nevertheless the only source available for interstate comparisons and rankings. Dated items are latest available.

b Computed from data on page referred to.

c *Thirteenth census of the United States, 1910. Abstract with supplement for Illinois*, p. 28, table 9.

d *Ibid.*, p. 29, table 11.

e *Statistics of state school systems, 1917–1918*, p. 93, table 20.

f *Thirteenth census of the United States, 1910. Abstract with supplement for Illinois*, p. 86, table 14.

g *Ibid.*, p. 56, table 18.

h School population estimated by the federal commissioner, on the basis of 5–18 years. The legal school age of Colorado is 6 to 21 years.

i *Statistics of state school systems, 1917–1918*, p. 95, table 22.

j *Ibid.*, p. 153, table 60. k *Ibid.*, pp. 144–5, table 55. l *Ibid.*, pp. 148–9, table 57.

m *Ibid.*, pp. 150–1, table 58. n *Ibid.*, p. 99, table 25. o *Ibid.*, p. 94, table 21.

p *Ibid.*, pp. 108–9, table 36, column 15. q *Ibid.*, pp. 108–9, table 36, column 11.

r *Ibid.*, p. 114, table 39. Includes salaries of superintendents, supervisors, and principals.

per capita of average attendance, she ranked thirty-fifth with respect to the percent of children enrolled who were in daily attendance. As a result of a careful study of the 1,725 rural districts included within the state, Sargent discovered that an average of 22 percent did not enroll each year.[7] Moreover, the average percent of the census enrolled varied all the way from 93 in Sedgwick County to 59 in Baca County, "while between the different districts within the same county the eight-year average varies from as low as 30 percent of the census to even more than 100 percent of the same."[8] Conditions with respect to the average daily attendance are even more unsatisfactory. Sargent continues:

> The average daily attendance of those who did enroll, and thus came under the influence of the school, makes a far worse showing. The county at the bottom of the list had an average daily attendance of but 51 percent of the enrollment for the eight-year period, while the one at the top of the table had an average of 77 percent. The eight-year average for the sixty counties and 1,725 third-class districts was but 61 percent of the enrollment. This means that on the average 39 children out of each 100 enrolled were out of school each day.[9]

It might seem that the explanation of the above incomplete enrollment and irregular attendance lies in the topography of the state, in its low density of population, or in the large percent (49.3) of its population which is rural. Such explanations are untenable in the light of Sargent's study. He writes, "The great majority of the school children in Colorado's rural schools live in districts and attend schools where there is a sufficient number of children to make very efficient schools." Again, in a concluding paragraph, Sargent states that the topography of the state is not a serious obstacle in the way of effective school systems:

> The great majority of the country children in this state live under conditions that are favorable for good schools and if all these would consolidate where consolidation is easily possible and feasible, these localities would make much more progress in school improvement in a single year than they have from the time the districts were established up to the present time.

[7] SARGENT, C. G. *Rural and village schools of Colorado*, p. 13.

[8] This seemingly strange condition (i.e., enrolling more than 100 per cent of the school census) is made possible because of the fact that after February 10, the date the school census is taken, no further census record is made of children who move into the district. Consequently, if a sufficient number of children move into a district after February 10, and attend school, it is possible that the school enrollment will exceed the school census.

[9] SARGENT, C. G. *Rural and village schools of Colorado*, condensed from p. 20, omissions not indicated.

Reserving for concluding paragraphs further discussion of educational inequalities, we may now turn to the questions in which our chief interest lies: (1) from what sources Colorado derives her moneys for public schools; (2) how these moneys are disbursed; (3) to what objects they may be lawfully applied; (4) the chief merits, defects, and desirable modifications of the present system of school support.

In order to compare conditions in Colorado with those in other states, it was necessary to select some year for which it was possible to secure data for a large number of commonwealths. At the time the present study was begun, the most recent comparative data available for all states were those for the years 1915–1916 contained in volume 2 of the 1917 report of the commissioner of education. The data presented by Monahan and Cook, which were of inestimable value but which could not be reproduced, were for 1915. For these as well as for a number of other reasons 1915 was the year selected for making comparisons. Shortly after the present study had been completed, not only were the 1918 data for all states made available by the Bureau of Education, but the 1919 education laws of Colorado were published. It seemed advisable, therefore, to revise the present account in order to present as far as possible conditions in 1918. In many cases, however, this was impossible, and in others the gain would have been too slight to warrant the work involved in such revision.

It may not be amiss to note at this point a few of the difficulties which have been encountered. The information given in the United States commissioner's reports is in many cases unreliable, as will be seen from the fact that the commissioner has for a number of years regularly reported certain Colorado school moneys as derived from "state tax or appropriations."[10] The truth is that no moneys whatsoever are derived from a state school tax nor have moneys been derived, prior to the acceptance of the Smith-Hughes Act, from regular annual appropriations. The term, "general fund by apportionment," is used in Colorado reports to designate the total quota of current school revenue distributed to school districts. It is derived from state funds, county funds, and that portion of the national forest reserve fund which is used for schools. There is no way of ascertaining what share of the

[10] *United States commissioner of education report*, 1917, 2:51.

moneys is derived from state and what share from county sources. No state record appears to be kept of the quota of the national forest reserve fund income devoted by counties to schools. The above difficulties are typical of the many which have been met. They explain the incompleteness of the present account at certain points.

School units in Colorado.—The state of Colorado is divided into 63 counties, which in turn are divided into first-, second-, and third-class school districts and three classes of high-school districts. In 1915 the total number of school districts was 2,019, as follows:

School Districts		High Schools	
First class	31	District	121
Second class	59	Union	29
Third class	1758	County	21
	1848		171
Total			2019

The sources from which Colorado derives her moneys for common schools fall into four classes, namely: federal, state, county, and district.

Federal Aid

National forest reserve fund.—Chapter 192 of the Acts of Congress (May 23, 1908) provided that thereafter 25 percent of all moneys received from each forest reserve during any fiscal year, including the year ending June 30, 1908, was to be paid at the end thereof to the state or territory in which said reserve is situated, to be expended as the state or territorial legislature may prescribe for the benefit of the public schools and the public roads of the county or counties in which the forest reserve is situated.

The state of Colorado received from the national forest reserve fund, from leases of forest reserve lands and the sale of lumber, for the school year 1915–1916, $63,995.00. This was distributed to 42 counties in which the reserves were situated and it was used by the counties for schools and roads, the amount for each purpose, above a minimum of 5 percent, being determined by the county commissioners.[11]

[11] *Report of the Colorado school system*, p. 33. Monahan's table shows the amount received by each county. The total receipts for the biennium 1916–1918 (i.e., for the years 1917 and 1918) were $165,698.75. The same was disbursed *in toto*. (*Colorado state treasurer's report*, 1916–1918, p. 8.) The average annual sum, therefore, was $82,849.37½.

As already noted, no state record is available of the quotas of national forest reserve fund income devoted by the state to school or other objects of expenditure.

Federal fines.—The federal criminal code provides that all fines collected for injuring by fire the public domain, i.e., United States government lands, shall be paid into the public school fund of the county in which the lands are situated. These fines, though collected in the county and turned into the county school fund, are levied under the federal law for infringement upon federal property. They must, therefore, be regarded as federal moneys devoted to common schools.[12]

Smith-Hughes grant.—The Smith-Hughes bill, providing federal aid to the states for vocational education, was accepted by Colorado by an act approved April 10, 1917. Many standards and conditions must be met in order to receive such federal aid. The one requirement which bears directly upon the subject of school finance is that the states must match dollar for dollar the federal grant.

The Colorado legislature of 1919 provided for a permanent annual appropriation of $10,000 for administering and supervising the Smith-Hughes work and appropriated the following sums for the years indicated to match the federal grants:[13] 1919, $27,560; 1920, $31,950; 1921, $36,340; 1922, $40,730; 1923, $45,120; 1924, $53,900; 1925, and annually thereafter, $62,680.

Table II shows the total (federal and state) moneys spent on vocational education, and the unexpended balance of Smith-Hughes moneys:

TABLE II. SMITH-HUGHES FUND FOR VOCATIONAL EDUCATION, 1917–1918[a]

Federal moneys expended for:	
Vocational agriculture	$ 3,737.50
Trade, industry, and home economics	3,333.34
Teacher training	4,000.00
Total federal grants	11,070.84
Moneys appropriated by state	11,070.84
Total expended for vocational education	22,141.68
Smith-Hughes federal moneys unexpended	3,929.16[b]

a Second annual report of the federal board for vocational education, pp. 110–12.
b Computed from figures given in *ibid.*

[12] *Federal criminal code*, secs. 52–54. *Colorado school laws, annotated*, 1917, p. 99, secs. 168, 169; p. 100, sec. 170.
[13] *Colorado educational laws*, 1919, pp. 37, 38.

State Aid

The public school fund.—Colorado levies no state tax for common schools and prior to the acceptance of the Smith-Hughes grant had pursued no policy of providing either general or special appropriations.[14] The United States commissioner's report erroneously states that in the year 1914–1915, Colorado received for the common schools $1,953,008 derived from "state tax or appropriations."[15] This sum was in reality the "general fund by apportionment" as reported for the year 1914.[16] The only educational tax levied in Colorado is a state tax of two-fifths of one mill levied for the support of the state university. The sole state source, prior to 1917, aside from the proceeds of certain state fines from which common school revenues were derived, was the permanent common school fund, officially known as the public school fund.[17]

The following statement shows the condition of the public school fund (cents omitted) as reported on November 30, 1916.

Invested cash, principal	$3,777,154	
Certificates of purchase (representing deferred payments and drawing 6% and 7% interest)	3,498,925	$7,276,079
3,037,358 acres unsold school land, estimated value	45,560,367	
Estimated value of 250 acres of mineral land	50,000,000	95,560,367
		$102,836,446[18]

Value of unsold school land.—Any valuation assigned to the three million acres of unsold school land belonging to the public school fund is to be regarded as entirely hypothetical. Three and

[14] In addition to the moneys required to match the Smith-Hughes grant, the legislature of 1919 appropriated $4,000 for a child welfare bureau and $200,000 as a state educational loan fund for disabled sailors and soldiers (*Colorado educational laws*, 1919, p. 18, sec. 5; p. 32, sec. 3). Although these may be regarded as educational appropriations, neither is for common schools. The $150,000 "appropriated" for equalizing teachers' salaries, as explained below (p. 752), is not in any real sense an appropriation but rather a transfer from the income of the public school fund.

[15] *United States commissioner of education report*, 1917, 2:51.

[16] *Twenty-first biennial report of the state superintendent of public instruction*, 1916, p. 39.

[17] Constitution, art. IX, sec. 5. Several other titles are used in official reports and in the laws, e.g., permanent school fund, state school fund, public school land permanent fund. It is unnecessary to state that the correct title is that provided by the constitution. For an account of the origin of this fund, see F. H. Swift's, *A history of public permanent common school fund in the United States, 1795–1905*, chapters 3 and 13.

[18] *Colorado state land commissioners' report*, 1915–1916, pp. 3–4. This is the only statement I have found anywhere which includes certificates of purchase.

a half dollars per acre is the minimum price fixed by law.[19] This minimum has had apparently very little influence upon the actual sale price. The average sale price from 1907 to 1914 inclusive was approximately $10.50 per acre. During the biennium 1915–1916, the average price per acre was $11.15 and during 1917–1918, $14.37. The $45,000,000 valuation stated above refers to the surface valuation only. To this it is necessary to add a considerable sum to represent the prospective returns from mineral products existing in school lands. In 1916 the state land register's office wrote: "The state has nearly 3,300,000 acres of land left, worth some $350,000,000; approximately 500,000 acres being underlaid with coal, which is estimated by the superintendent of the mineral division to be worth $200 per acre, or $100,000,000 making an estate to be handled reasonably worth $125,000,000."[20]

Sources of increase.—The following sources are provided for increasing the principal of the public school fund:[21] (1) the proceeds from all common school lands granted to the state by the federal government for educational purposes; (2) all estates that escheat to the state; (3) all other grants; (4) gifts; (5) devises made to the state for educational purposes; (6) all rentals and royalties received by the state as rentals and royalties from stone, coal, oil, gas, gold, silver or other mineral lands belonging to the public school fund; (7) fines imposed upon county officers for neglect of land act duties. It is scarcely necessary to state that

TABLE III. PUBLIC SCHOOL FUND LAND SALES, 1907–1914[a]

Biennial Term[b]	Acreage Sold	Total Purchase Price	Average Price per Acre
1907–1908	60,356.25	$ 521,627.04	$ 8.31
1909–1910	287,340.63	3,331,591.59	11.59
1911–1912	79,639.33	826,268.17	10.38
1913–1914	91,215.57	762,375.80	7.35
Total	518,551.78	$5,441,862.60	$10.50 (avg.)

[a] All data in this table are taken from the *Colorado state land commissioners' report*, 1913–14, p. 5.
[b] As already noted, many of the Colorado reports give biennial but not annual data.

[19] *Colorado state land laws*, 1914, p. 49, sec. 133; *ibid.*, 1917, p. 9, sec. 16.
[20] *Colorado state land commissioners' report*, 1913–14, p. 5; 1915–16, p. 3; 1917–18, p. 3.
[21] Constitution, art. IX, sec. 5; *Colorado school laws, annotated*, 1917, p. 105, sec. 183; p. 106, sec. 187; *Colorado session laws*, 1914, p. 46; *Colorado land laws*, 1914, p. 62, sec. 162; p. 46, sec. 127.

the largest increment of the public school fund has been derived from the proceeds of the sale of school lands. Table III shows the acreage of the school lands sold 1907–1914 inclusive, the net proceeds, and the average price per acre.

The moneys thus far added to the public school fund from the proceeds of escheats appear to be negligible. The only record I have found of any additions from this source is $7,888.56, added during the biennium ending December 1, 1914.[22] The proceeds of unclaimed estates are set aside and kept as a separate account known as the escheats fund. The moneys belonging to this fund are held by the state for 21 years awaiting possible claimants. At the end of the 21 years the estate may escheat to the state, and the proceeds be added to the public school fund.

Growth of public school fund.—The proceeds of fines (from $5 to $500) imposed upon county officers for neglecting to perform any duty required by the provisions of the State Land Act are added to the permanent public school fund.

Table IV shows the biennial growth of the principal and income from 1903 to 1918 inclusive and the average annual increase of the latter.

TABLE IV. GROWTH OF PUBLIC SCHOOL FUND, 1903–1918[a]

Biennium	Balance in Treasury at Opening of Biennium(b)	Amount Added During Biennium(c)	Average Annual Increase (Computed)
1903–1904	$1,254,716.73	$ 129,612.84	$ 64,806.42
1905–1906	1,384,329.57	48,729.67	24,364.83
1907–1908	1,433,059.24	168,847.93	84,423.96
1909–1910	1,601,907.17	446,385.43	223,197.71
1911–1912	2,048,292.60	579,120.59	289,197.71
1913–1914	2,627,413.19	431,106.37	215,553.18
1915–1916	3,058,519.56	718,634.62	359,317.31
1917–1918	3,777,154.18	1,171,338.05	586,669.02

a All data taken from reports of Colorado state treasurer for biennium referred to.
b Certificates of purchase apparently not included.
c Does not include total receipts as small sums were disbursed. See reports of the Colorado state treasurer as here cited.

Management of public school fund.—The management of the public school fund is divided between the state board of land commissioners and the state treasurer. The state board of land commissioners is composed of a president, a register, and an

[22] *Colorado state treasurer's report*, 1913–1914, p. 5.

engineer[23] whose salaries are fixed by law at $3,000 per annum. The state treasurer is the custodian of the fund. To protect public moneys against misuse or manipulation for the sake of private gain, the laws declare making profits on the same to be a public felony.[24] All interest on the purchase money and all money derived from rents and leases for the occupation and use of the surface of school lands are paid by the register to the state treasurer, who credits the same to the income of the public school fund. This current fund is known as the public school land income fund.

Investment losses.—Colorado, like many other states, has experienced great difficulty in finding proper securities in which to invest school funds. The aim of those framing the laws and prescribing legal securities seems to have been to guarantee that bonds and warrants issued by the state might be sure of a purchaser, namely, the public school fund. Prior to 1919, neither the bonds of the United States nor the bonds of other states were included in Colorado's list of lawful investments for school fund moneys.[25] Large funds pouring into the state treasury, subject to investment, and an extremely limited range of securities in which such funds could be lawfully invested, could have but one result, namely, large sums on hand for which no lawful investments could be secured. Various laws have been passed designed to remedy this situation.

In 1905 a law was passed known as the State Land Loan Act, one purpose of which was to extend the range of the lawful investments of state funds. Section 37 provided that all state funds raised from the sale or rent of state lands, unless otherwise disposed of by law, shall be invested: (1) in bonds of the state of Colorado; (2) in interest-bearing warrants of the state of Colorado; (3) in irrigation district bonds; (4) in 6 percent loans of $1,000 or less, or if possible, of $500 or less, on unincumbered real estate for a period of from one to five years.[26]

This law accomplished little. Moreover, the constitutionality of the investments in real estate loans was seriously questioned. In 1916, by a referendum vote of the people, a bill known as the

[23] *Colorado state land laws*, 1914, p. 41, sec. 115; p. 57, sec. 151; *Colorado school laws, annotated*, 1917, p. 105, sec. 182; Constitution, art. IX, sec. 3.

[24] Constitution, art. X, sec. 13; *Colorado school laws, annotated*, 1917, p. 105, sec. 184.

[25] In 1918 the state invested $100,000 in Liberty Loan Bonds. See below, page 659.

[26] *Colorado session laws*, 1905, p. 334–35, chap. 134, sec. 37; *Colorado revised statutes*, 1908, pp. 1223–24, sec. 5198; *Colorado state land laws*, 1914, p. 57, sec. 151.

Farm Land Loan Bill was passed. This bill provided that, "All school funds of the state, whether permanent or income, unless otherwise disposed of by law, shall be invested as directed by the state board of land commissioners" in the following securities:[27] (1) interest-bearing warrants of the state of Colorado; (2) bonds of the state of Colorado; (3) farm loans; (4) Colorado school district bonds; (5) Colorado county, city, or town bonds approved by the attorney general and the state board of land commissioners. The investment of public school funds in farm mortgages was subsequently declared unconstitutional.

As a result of the failure to provide proper and sufficient securities for the investment of state funds and the consequent large sums remaining uninvested from year to year, the educational fund in Colorado has been deprived annually of large portions of the revenue which it should have earned. Not only is this true, but the harmony which should exist between the state treasurer (the custodian of the fund) and board of land commissioners, for the best handling of the fund could not be maintained. The land commissioners continued to urge that the funds be invested in accordance with the provisions of the State Land Loan Act passed in 1905, while the state treasurers, in defiance of the land commissioners' authority, who are empowered by law to direct the investment of these funds, successively refused to invest the funds in securities other than state warrants and state bonds. Such refusal resulted in a large uninvested surplus. This, in defiance of the state land commissioners, if not of the law, was deposited in various banks scattered throughout the state.

The auditor reports that between January, 1901 and 1911 the income of the fund was deprived of $24,408.90 by shortages in the state treasury. From the following statement of investment of the public school fund,[28] it will be seen that in 1916 one-fourth of the principal of the fund was deposited in banks:

State Warrants	$ 433,919.24
Insurrection Bonds, 1909	659,544.05
Funding Bonds, 1910	1,696,263.08
Insurrection Bonds, 1914	438,700.00
Deposited in Banks	1,149,627.81
Total	$4,378,054.18

[27] *Colorado state land commissioners' report*, 1915–1916, pp. 7–11.
[28] *Colorado state treasurer's report*, 1915–1916, p. 8.

Such a condition emphasized the necessity of providing new avenues of investment. In 1917–1918 the Farm Land Loan Act was put into operation, and in 1919 the legislature passed an act providing for the investment of moneys belonging to the public school investment funds in United States bonds.[29] The following statement shows the investments in 1918:[30]

U. S. (Liberty Loan) Bonds	$ 100,000.00
State Bonds	2,721,047.00
State Warrants	412,561.13
County and Municipal Bonds	869,367.88
School District Bonds	363,050.50
Farm Loans	66,300.00
Cash on hand Nov. 30, 1918	416,165.72
Total	$4,948,492.23

State fines, general school fund.—The proceeds of penalties for at least two classes of state offenses covered into the state treasury are added to the general school fund of the state:[31] (1) fines ($25 to $300) for violations of the provisions of mining laws or the rules of the state commissioner of mines; (2) "forfeiture for failure to publish and distribute official state reports required by law to the members of the legislature on the date fixed by law."

County Aid

Colorado possesses no local public permanent common school funds, either county or district. The terms, "general school fund" and "county school fund," are employed in the laws to denote the sum total of school moneys received into the county treasury. This includes six classes of current funds: (1) quotas from the national forest reserve fund (42 counties); (2) quotas from the income of the public school fund; (3) moneys derived from the general county school tax; (4) special taxes for county high schools and for district high schools located at the county seat; (5) proceeds of the sales of lost articles and estrays; (6) proceeds of fines. Preceding paragraphs have shown that of the above six classes of funds (1) and (2) are federal and state funds respectively. The only relation which the county has to them is that it serves as an agency for disbursing them to the

[29] *Colorado educational laws*, 1919, p. 10.
[30] *Colorado state land commissioners' report*, 1917–1918, p. 16.
[31] *Colorado revised statutes*, 1908, p. 1078, sec. 4305; p. 1136, sec. 4710; p. 1226, sec. 5209; *Colorado state land laws*, 1914, p. 67, sec. 162.

districts. Our present discussion, therefore, will be confined to the last four of the six classes of funds just named.

General county school tax.—The laws of Colorado require that all taxable property be listed, valued, and assessed at its full cash value. Each county is required to levy annually a general county school tax of not less than ten mills. In Colorado the county is a school unit only in a subordinate sense. The purpose of the county general school tax is to furnish money for the districts—sufficient to enable each to maintain a public school six months in each year.[32] The amount of money needed to maintain the schools the minimum term must be determined and certified in advance by the county superintendent to the board of county commissioners, whose duty it is to levy the general county school tax. In making the estimate, the county superintendent shall use as a basis the sum of sixty dollars per month for each teacher employed in third-class districts and seventy-five dollars per month for each teacher employed in first- and second-class districts. Districts whose school population, as shown by the school census preceding the time of making the levy, was less than fifteen shall not be included in the estimate. The money raised by general county school tax shall be used for teachers' wages only. All other expenses[33] of the school districts must be provided for by a special district tax.

County high-school four-mill tax.—In addition to the general county school tax, a special high-school county tax, not to exceed four mills, may be levied to furnish current support for a county high school. There are three classes of high schools in Colorado: (1) district high schools; (2) county high schools; (3) union high schools.[34]

District high schools may be maintained in any first- or second-class, but not in a third-class (rural) district. District high schools are supported (a) by their quotas from the general fund and (b) by a special district tax. County high schools, unless

[32] *Colorado educational laws*, 1919, pp. 34–35, sec. 1. Prior to 1919 the maximum tax had been five mills and the minimum school year four months. See *Colorado school laws, annotated*, 1917, pp. 161–62, 168.

[33] This statement taken directly from the laws is, of course, inaccurate, as many expenses are provided by state funds.

[34] *Colorado school laws, annotated*, 1917, p. 142, sec. 281, note. This note defines the different kinds of public schools in Colorado, and summarizes their sources of revenue. The data in the present section, unless otherwise indicated, are taken from this note.

otherwise voted by a majority of the electors of the entire county, are established at the county seat. They are free to all children within the county. They are supported (a) by their quotas from the general fund and (b) by a special county high-school tax not to exceed four mills upon all taxable property within the county. Union high schools are high schools maintained for a district formed by the union of two or more districts. Union high-school districts are of three kinds: (1) districts "composed of two or more contiguous districts, not including a county seat or an incorporated city or town in a fourth- or fifth-class county"; (2) districts composed of districts contiguous to and including an incorporated city or town in fourth- or fifth-class counties; (3) districts in which the county seat is all included in one district.

Our interest in union high-school districts is limited to those of the above third class, as they alone are supported (a) by their quotas from the general fund and (b) by a levy of not less than one nor more than four mills on all taxable property of the county. In 1919 a law was passed whereby any consolidated school district maintaining an accredited high school and any school district organized into a union high-school district and maintaining therein an accredited high school may, by a majority vote of its electors, be exempt from payment of county high-school taxes.[35]

County high-school bonds and bond tax.—Counties maintaining county high schools and which are, therefore, in themselves high-school districts are empowered to issue bonds for the purpose of raising money to erect and furnish high-school buildings, to purchase grounds, or to fund floating debts, provided that: "in no case shall the aggregate amount of bonded indebtedness of any high-school district for high-school purposes exceed two percent of the assessed value of the property of such high-school district."[36] The county commissioners are required to levy and assess a special tax on all taxable property of such county-high-school districts sufficient: (1) to pay the interests on such bonds; (2) to provide for the redemption of the same at maturity.[37]

Estrays, fines, and forfeitures.—"All funds arising from the sale of lost goods and estrays shall be paid . . . to the county treasurer of the county in which the same have accrued, and shall

[35] *Colorado educational laws*, 1919, p. 34. [36] *Ibid.*, p. 19, sec. 40.
[37] *Ibid.*, pp. 20–21, sec. 42.

be by him credited to the general county school fund."[38] The proceeds of not less than 21 classes of county fines and forfeitures are devoted to the general county school fund by law.[39]

District Aid

Importance of the school district.—It is no exaggeration to say that in Colorado the school district is the determiner of the school situation. The district board not only has charge of the school property and employs the teachers, but it adopts the course of study, selects the textbooks, and fixes the length of the school term above the minimum required by law.[40] In matters of school finance the district is equally important and supreme. Its economic importance is shown by the fact that by far the largest quota of school revenue comes from the special district school tax—in 1914–1915, 71 percent.[41] Furthermore, all school revenues, federal, state, and county, are brought into one fund, the general fund by apportionment, and then turned over to the districts to be used by them for any lawful object in any proportion the district determines, provided only that a school be maintained the minimum school year and that every teacher employed be paid at least the minimum wage per month.

District sources of school moneys.—The common school moneys furnished by the district are derived from the following sources:[42]

1. District school taxes (a) "special school tax" required[43] of all districts (limit in third-class districts, 20 mills);[44] (b) special district school bond tax;[45] (c) special district high-school tax;[46] (d) teachers' retirement fund tax (in first-class districts only) not to exceed one-fifth of one mill[47]

[38] *Colorado school laws, annotated*, 1917, p. 110, sec. 201. For details compare *Colorado revised statutes*, 1900, p. 1479, sec. 6369; p. 1606, sec. 6895.

[39] It has been necessary to omit a table compiled from an exhaustive study of the revised statutes, presenting these 21 offenses and the corresponding penalties.

[40] *Colorado school laws, annotated*, 1917, pp. 68–71, sec. 134.

[41] *Report of the Colorado school system*, p. 34. Table VI shows that according to the data given in the state superintendent's report only 53.6 percent was derived from special district tax.

[42] It must be borne in mind that we are dealing here with the sources which the districts provide, not with all the sources from which they receive funds. This explains why no mention is made in the present section of the public school emergency fund, or the minimum wage for teachers fund. These funds are, as will appear later merely quotas of the income of the public school fund. They will be discussed in connection with the topic "Disbursement of the public school fund."

[43] *Colorado school laws, annotated*, 1917, p. 162, sec. 331.

[44] *Ibid.*, p. 165, sec. 336. [45] *Ibid.*, p. 9, sec. 14; pp. 11–12, secs. 21, 23.

[46] *Ibid.*, p. 142, sec. 281, note. [47] *Colorado educational laws*, 1919, p. 33, sec. 4.

2. District bonds[45]

3. Fines[46]

Special school tax and uses.—"Special school tax" is the term definitely provided by law to designate the tax levied by all school districts.[49] This tax is required of all districts. "If any school district shall fail to certify a special tax for other expenses (than teachers' wages) necessary to maintain a public school each year . . . the county commissioners shall cause the same to be levied."[50]

As already noted, the county is required to furnish by a county school tax not to exceed ten mills sufficient funds to enable each school district within the county to maintain a school six months and pay each teacher not less than the minimum wage. It has also been noted that the moneys received by general county school tax must be used for teachers' wages only. It is necessary for districts satisfied with maintaining only minimum standards to raise by taxation moneys additional to those derived from the county and the state. Districts are permitted to devote the proceeds of not more than ten mills of the special tax levy to these purposes.[51]

Items of school expenditure which the district is expected to finance by its special school tax are shown in the following schedule.

Items of expenditure to be met in part or *in toto* by special school tax:[52]

1. All districts: (1) teachers' wages (only in part as already noted); (2) public library books; (3) purchase of school lots (upon vote of district), school houses, erection, removal, repair, rent, and insurance; (4) furniture and equipment; (5) free textbooks for indigent children (or for all upon a majority vote); (6) tuition of pupils attending school in another district; (7) transportation of pupils; (8) pupils' board if transportation is unfeasible.

2. First-class districts only: (1) playgrounds; (2) schools (continuation, part time, evening, vocational, opportunity, for aliens, open air); (3) special subjects: instruction in and teachers

[45] *Colorado revised statutes*, 1908, p. 270, sec. 440; p. 292, sec. 535.
[49] *Colorado school laws, annotated*, 1917, p. 165, sec. 336.
[50] *Ibid.*, p. 162, sec. 331.
[51] *Colorado educational laws*, 1919, pp. 34–35, sec. 1. Minimum salaries per month: $60 in third-class districts, $75 in first- and second-class districts.
[52] *Colorado school laws, annotated*, 1917, pp. 68–71, sec. 134; p. 165, sec. 336; *Colorado educational laws*, 1919, pp. 36–37.

of such subjects as drawing, music, manual training, home economics (including care of children); industrial subjects; vocational subjects; subjects for the training of such special teachers, normal training subjects.

The amount to be raised by the district or special school tax is determined in third-class districts by the vote of the qualified electors;[53] in first- and second-class districts by school boards.[54] The procedure involved in levying district taxes is similar to that involved in levying the county school tax. The district determines in advance the amount of money necessary to be raised by special school tax for the ensuing year, such levy in third-class districts not to exceed twenty mills. Thereupon the district school board certifies to the board of county commissioners the aggregate amount to be raised by special school tax in a statement showing: "the items composing said aggregate and the purpose to which it is intended to devote each sum so itemized. It shall thereupon be the duty of the county commissioners to levy, at the same time that the other taxes are levied, such rate, within the limits allowed by the law, as will produce the aggregate amount so certified."[55]

District bonds and bond taxes.—For the sake of raising moneys for erecting and furnishing school buildings or purchasing grounds, or for funding floating debts, districts are empowered to issue bonds, provided that the amount of bonded indebtedness of any first- or second-class district shall not exceed 5 percent or of any third class, 3.5 per cent of the assessed value of the property in such district for the year next preceding the date of said bonds. The interest and principal of such school bonds shall be paid by a tax levied and assessed by the county commissioners on the taxable property of the district.[56]

District high-school tax.—Union high schools, in districts "organized from districts contiguous to and including an incorporated city or town in fourth- and fifth-class counties" are supported in part by their quota from the general fund by apportionment

[53] *Colorado school laws, annotated*, 1917, p. 96, sec. 164.

[54] *Ibid.*, p. 61, sec. 120. "In districts of the first and second class the boards, after organization, shall exercise all the powers given to the electors of school districts of the third class."

[55] *Ibid.*, p. 165, sec. 336.

[56] *Ibid.*, p. 9, secs. 14–15; pp. 12–13, sec. 23; *Colorado educational laws*, 1919, p. 10.

and in part by a special high-school tax of "not less than one nor more than three mills on all taxable property therein."[57]

Teachers' retirement fund tax.—"In every school district of the first class there may be created a school teachers' retirement fund, which shall be controlled by the board of school directors of the school district concerned."[58] "The moneys for the use of the public school teachers' retirement fund shall be secured by a special levy upon the said school district, such special levy, however, not to exceed one-fifth of one mill, and from any gifts or bequests which may be made to the said fund."[59]

Fines.—Although the proceeds of all fines, federal, state, and county, are eventually apportioned among the districts, only two of the many fines consigned to schools may be regarded as district fines: (1) fines of five to twenty dollars imposed upon a parent or guardian who fails to require a child of compulsory school age to attend school;[60] (2) fines for violations of laws governing the construction of public buildings (transferred to the public school fund of the county, city, or incorporated town in which the misdemeanor is committed). These fines were listed with the sources of county aid. They must be included also among district sources, since cities and incorporated towns are organized as school districts.[61]

The following three tables show the sources from which all school moneys are derived in Colorado, the increase of school revenue in 1915 over that of 1905, and the relative importance of the state, the county, and the district as sources of school revenues.

The relative importance of state, county, and district revenues may be inferred from the fact that in the year 1914–1915, 7 percent of the total school revenue was derived from state sources, 22 percent from county sources, and 71 percent from local sources.[62]

In 1915 eleven counties derived from 1 to 5 percent of their total revenue from state sources, one county derived a similar

[57] *Colorado school laws, annotated*, 1917, p. 142, sec. 281, note.
[58] *Ibid.*, p. 170, sec. 341.
[59] *Colorado educational laws*, 1919, p. 33, sec. 4.
[60] *Colorado revised statutes*, 1908, p. 292, sec. 535; eight to fourteen years is the compulsory school age under ordinary conditions. For an explanation, see the section here referred to in the revised statutes.
[61] *Ibid.*, p. 270, sec. 440.
[62] *Report of the Colorado school system*, pp. 34, 36.

TABLE V. SOURCES OF COLORADO COMMON-SCHOOL REVENUES, 1919

Classes of Sources	Federal	State	County	District
Permanent funds and lands	National forest reserve fund	Public School fund	None	None
Appropriations	Smith-Hughes grants	$10,000 annually to administer S-H work; appropriations to match S-H grants	None	None
Fines and forfeitures	Fire fines	Mining; state report publishing	For twenty-one different offenses	Truancy fines; building fines
Bonds	None	None	County high school(*a*)	District bonds[a]
School tax	None	None	2.5 mills general county school tax; four-mill high-school tax; special bond tax	Special school tax, bond tax; high-school tax; teachers' retirement fund tax

a For raising moneys for erecting and furnishing school buildings, for purchasing grounds, or for funding floating debts.

TABLE VI. COLORADO SCHOOL REVENUES IN 1905 AND 1915[a]

	1905	1915	
		Amount	Percent from Source Named
Amount on hand July 1 held by county and district treasurers	$ 889,070.59	$1,064,008.55	11+
From general fund by apportionment(*b*)	1,095,487.32	2,061,977.28(*c*)	21+
From special (district) tax	2,804,960.60	5,080,195.41	53.6
From all other sources	478,938.04	1,264,308.01	13+
Total receipts	$5,268,456.55	$9,470,489.25(*d*)	

a *Colorado state superintendent of public instruction reports*, 1905–6, p. 256; 1915–1916, p. 41. Percent computed.

b General fund by apportionment includes moneys paid to districts derived from (1) national forest reserve fund; (2) state funds; (3) county funds.

c In 1914–1915, $598,607 derived from public school fund (*United States commissioner of education report*, 1917, 2:51) and $1,570,493 from county taxation (*Report of the Colorado school system*, p. 34). The total of these two sums, $2,169,100.00, is greater than that reported for the entire general fund by apportionment by the superintendent of public instruction.

d The revenue for 1915–1916 as given in the *United States commissioner of education report* for 1917, volume II, is identical with that given in the *Report of the state superintendent of public instruction*, 1916, for the year ending June 30, 1915. If one subtracts (in latter report) the balance on hand, $1,064,008.55, from the total, $9,470,489.25, the total revenue is the same as the United States commissioner of education reports, that is, $8,406,480.70. Adding the items given in the commissioner's report as income from the permanent funds and state tax, one gets $2,061,977, the same as the state superintendent reports for general fund. Adding in state report the items on special tax and all sources one gets $6,344,503.42, same as commissioner's item for local tax.

percent of its total revenue from county sources, and seventeen counties derived from 81 to 85 percent from district sources. Table VII presents these data for the entire state.

TABLE VII. PERCENT OF TOTAL SCHOOL SUPPORT DERIVED BY COUNTIES FROM STATE, COUNTY, AND DISTRICT REVENUES, 1914–1915[a]

Percent	Number of Counties Deriving Indicated Percent of Support from			Percent	Number of Counties Deriving Indicated Percent of Support from		
	State Fund	County Fund	District Fund		State Fund	County Fund	District Fund
1–5	11	1	.....	46–50	.....	1	0
6–10	46	12	.....	51–55	.....	.....	2
11–15	4	16	.....	56–60	.....	.....	1
16–20	2	16	.....	61–65	.....	.....	1
21–25	.....	9	.....	66–70	.....	.....	13
26–30	.....	4	.....	71–75	.....	.....	13
31–35	.....	1	.....	76–80	.....	.....	13
36–40	.....	1	.....	81–85	.....	.....	17
41–45	.....	2	1	86–90	.....	.....	2

a Computed from data given in *Report of the Colorado school system*, p. 35.

(To be concluded in November)

Editorials

CONCERNING EDUCATIONAL POLICY

The announcement of the JOURNAL OF EDUCATIONAL RESEARCH as it appeared in the January, 1920 number emphasized the practical character which the Journal wished to assume. We were sure that much writing on research topics was hard reading even for the superintendent who is also a student. It was our suspicion that not all the obscurity of this writing was necessary. To be quite frank, we felt—without at that time having put the feeling to the test—that no small amount of the difficulty which people experience in reading accounts of investigations was due to clumsy presentation and careless editing. Our experience since last January has converted our suspicions into certainty. We have consciously studied educational reporting and we have noticed many things. We have discovered problems in which some of the essential data were omitted and conclusions which were erroneously stated. We have found computations that wouldn't check up and two or three different names used for the same blank, or method, or group. We have read one number in the text and another in the table to which the text referred. Our attention has been called to equations with the signs left out, to formulas in which wrong letters and numbers occurred, and to graphs printed upside down. As to English—well, let him that is without fault cast the first stone.

Nevertheless, it would be idle to suppose that even the best expository method on the part of the author and the most sympathetic treatment on the part of the editor could make certain theoretical articles understandable to those whose training has not made them acquainted with their fundamental assumptions and terminology. Nothing, for example, could be clearer than the series of articles by Dr. Ayres which appeared in our March, April, May, and June numbers. Yet the very notions underlying these articles make them readable to but few school people. A new method of computing correlation and regression can be appreciated only by those who know the meaning of correlation and regression.

We do not labor under the delusion that our Journal can ever become a handbook for ill-trained teachers. Nor do we think even relatively well-trained teachers can reasonably be expected to be interested in every article. The usual process of specialization operates to prevent this. Education is a very broad idea, and educational research is not less so. Each one who opens this particular number of the Journal has his own special activity. If he is in the high school he is not likely to care much for an article about the primary grades. If he is a classroom teacher, supervisory problems will only mildly interest him. If he teaches chemistry, measuring the teaching of Latin will not excite him.

One may, however, properly contend that if education is broad and diversified, it is also one and indivisible; and that educational people ought to have interests beyond the range of their particular activities. This is a reasonable view; and it is not an unworthy purpose of our Journal to exalt among teachers, principals, and superintendents what the Herbartians used to call the "many-sided interest."

Yet our readers will be fortunate if, even though they have this many-sided interest, they find as many as one article in each of our issues which appeals to them. And we too shall be fortunate if this result is attained. To accomplish it two kinds of effort seem to be justified.

In the first place, we are justified in offering—and until such time as other periodicals take over certain phases of research we intend to offer—a diversity of material. For the research man we shall offer an occasional statistical or technical article. It looks as if we might have about one in each number. For the administrator, the supervisor, and the teacher whether in city or country we shall have something to present. The material we have in hand permits us to be confident on this point. Accordingly, each educational worker will, we hope, find something he can use. He will also find things which we believe will serve to broaden his interests.

In the second place, we think we are justified in providing material that will explain to those who have not had opportunity to study research methods the conceptions that are needed to understand them. One of the obvious needs is the field of statistics. We contemplate publishing this year a series of simple statistical articles—articles designed to tell to teachers, principals,

and superintendents the way to handle the quantitative work which they are increasingly called upon to do. We shall distinguish in these articles three purposes: (1) to give to educational workers a mastery of the statistics which they are now using; (2) to add to this some of the statistical methods which they would find useful if they were acquainted with them; and (3) to present such further material as they will need in order to read modern educational literature understandingly.

B. R. B.

RESEARCH IN TEXTBOOK PUBLISHING

The time will come when every important textbook publishing house will have its research man. It is the day of research in business. There is scarcely an industry that is not employing one or more experts, not as purchasing, selling, or production managers, but merely as students of the industry or of some of its phases. These experts are almost literally "turned loose" to discover new facts about the business, to make new combinations, to invent, standardize, and refine.

In the textbook business it is clear that research workers in education are needed. The critical attention now being given to the contents of school books discloses many ways in which they may be improved. Not long ago we heard a very able man, himself an eminent research worker, say after having examined minutely a large number of texts, that most books were adopted without anyone knowing what they contained—neither the committee that judged them nor the teachers who used them. Of course, he did not mean that the chief topics presented in the books were not known—although even that degree of knowledge is often lacking. What he meant was that the contents of the books were unanalyzed with reference to desirable objectives.

For example, if children may be expected to be able to handle seventy-five digits a minute in adding columns of figures, we shall want to know whether in a given arithmetic book the opportunities to add are sufficient to insure the desired result under average conditions and with normal children.

This simple illustration goes quite beyond the scope of the teacher. It demands the attention of the research worker. In the first place, is the standard of seventy-five digits a minute reasonable? If not, what is reasonable? This is clearly a social

question, involving a determination of the degree of skill in adding which is currently required. In the second place, how much should we exceed the social requirement in order to insure through "overlearning" that the pupil will meet the social demand after the practice of the skill has been discontinued? And in the third place, how much repetition of the opportunity to add is needed in order to meet the requirement? With this is combined the question of the distribution of these opportunities. Should they occur at frequent intervals or only occasionally? How frequently and how much opportunity at each occurrence?

Again, it is clear that addition of integers is a complex process. Different combinations of single digits have different difficulties and require different amounts of practice before the same degree of skill may be acquired in handling them. For example, adding 6's, 7's, 8's, and 9's is harder than adding 1's, 2's, 3's, and 4's. Yet Dr. Thorndike reported at the last Conference on Educational Measurements at Indiana University that a recent analysis of several arithmetics had revealed the fact that four times as many opportunities were afforded to add 1's, 2's, 3's, and 4's as were afforded to add 6's, 7's, 8's, and 9's. When we have found this out, we say at once that these books are badly made. Yet it is practically certain that writers of arithmetics ever since arithmetics have been written have been giving several times as much drill on easy combinations as on hard ones. It is doubtful if any of them ever thought of the question. Indeed, only lately have we learned how greatly the combinations differ in difficulty. Even as close a student of arithmetic as Courtis assumed in his early testing that their difficulties were substantially the same. This, by the way, may serve to illustrate the way in which new knowledge in education is accumulating and the unexpected applications that may be made of it.

Nor should we suppose that this remarkable inversion of emphasis is confined to addition. Dr. Thorndike also reported similar and even greater excess of drill on easy than on hard combinations for subtraction, multiplication, and division.

But having ascertained that there are more easy combinations in the arithmetics than hard ones, we have not yet carried our research problem very far even in the field of adding single digits. We next want to know how much more drill should be provided on hard combinations than on easy ones. Moreover, those classed as hard are not equally so. There must be still finer distinctions

We may also observe that these are not notions of that viewy kind, the exploitation of which has produced so many unusable books. Even the most conservative publisher would hardly deny the advantages of distributing drill according to the difficulty of operations; and a book which embodied such a feature would be neither more difficult to use nor more costly to manufacture.

But adding is not merely the combining of single digits. There are the operations of "bridging the tens," of "carrying," and of sustaining the attention throughout the adding of a long column—to say nothing of the operation of writing the figures under each other so that units will fall under units, tens under tens, etc. How much drill should a textbook afford in these particulars?

Clearly, too, the decision in these matters depends in no small degree upon the two factors which we have called "average conditions" and "normal children." What are the conditions which we are justified in calling "average"? Obviously a textbook which addresses itself to conditions above or below average may be justified only when the extent to which it does so is revealed. Thus an arithmetic might be announced as follows: "This book is designed to be used by teachers who have had normal school training and at least one year of experience and who teach but one grade of not more than thirty pupils." We feel sure that not a few arithmetics ought to be so announced. Our experience also leads us to believe that many textbooks—readers, histories, and geographies, as well as arithmetics—are better adapted to children of superior ability than they are to children of normal or inferior ability. Every teacher and supervisor who has had real teaching experience knows that most textbooks are too hard for the grades for which they are designed. The question of "average conditions" and "normal children" should be taken into account in the making of textbooks.

We have called the illustration of adding digits "simple"; and simple it surely is compared to some illustrations that might be taken. Yet it raises a host of questions which are not being satisfactorily answered under the present arrangements for making and publishing textbooks. The publishers need the services of a type of expert who can make a more searching analysis of the method and content of books with reference to the desirable outcomes of teaching and who can check up more objectively the results of the use of the books. B. R. B.

Reviews and Abstracts

E. H. Cameron, *Editor*

Briggs, Thomas H. *The junior high school.* Boston: Houghton Mifflin Company, 1920. 348 pp.

School superintendents, high-school principals, and serious students of education generally, will welcome this contribution of Professor Briggs to the general problem of the junior high school. While there has been a large amount of printed matter devoted to the junior high school, much of this has appeared only in the educational magazines and is not easily accessible to the student of school administration. Professor Briggs has attacked this problem from the proper point of view—that of the conservative who at the same time sees in this movement much that is distinctly encouraging. Professor Briggs, in addition to his scientific attitude toward the subject, has had the advantage of personal visits to many of the better junior high schools of the United States and as educational adviser of the Speyer Experimental Junior High School has had an opportunity to observe at close range the general development of the problem.

Those who are sympathetic with the junior high-school movement have been forced to confess that of the hundreds of schools which have been given the title "junior high school" or "intermediate school," but few have as yet thoroughly adapted their institution to the underlying principles which should control the organization of the intermediate school. In many cases this has been due to a real doubt in the mind of the administrator as to the special function of the junior high school. This book will give a basis for study and consideration which ought to result in a crystallization of ideas and eventually something approaching uniformity in organization. One is impressed by the judicial attitude which Professor Briggs has shown, in many cases, especially in his presentation of the claims and objections to the movement of which, of course, there are many. Although thoroughly sympathetic with the movement and a firm believer in its eventual universal acceptance, he appreciates the strength of the standard objections which are made by those who feel that the traditional 8-4 organization is really better adapted to American ideals and situations. It is to be hoped that states whose legislation practically precludes a general reorganization of education along the lines suggested in this book will within a few years amend their laws so as to make this development possible. It is also to be hoped that the difficulties in the way of utilizing the Smith-Hughes Act in promoting vocational education in the grades may be removed; for without question, especially in rural districts, the eventual organization of schools of the junior high-school type will be so general that vocational education will through them have its best opportunity for rendering really effective service. The reviewer heartily sympathizes with the closing sentence of Professor Briggs' volume, "In its essence, the junior high school is a device of democracy whereby nurture may cooperate with nature to secure the best results possible for each individual adolescent as well as for society at large."

Charles E. Chadsey

HANUS, PAUL H. *School administration and school reports.* Boston: Houghton Mifflin Company, 1920. 200 pp.

This little volume consists of a reprint of a number of papers presented by Professor Hanus at various occasions during the last eight years. A number of the chapters have genuine interest to superintendents as they present clearly Professor Hanus' point of view on the general subject of school administration. Chapter III, which is devoted especially to a consideration of superintendents' reports, was originally presented by him as chairman of Section L—Education, American Association for the Advancement of Science, 1915. To superintendents who have not given a careful consideration to the relative importance of the various topics which naturally are found in the annual report of the superintendent, this chapter will be suggestive and quite worth while. Several of the papers that have been attached at the end of the volume seem, in the opinion of the reviewer, to have little significance in a volume devoted, supposedly, to school administration. They are, however, of interest especially to the many friends of Professor Hanus.

CHARLES E. CHADSEY

BEXELL, T. A. *First lessons in business.* Philadelphia: J. B. Lippincott Company, 1919. 174 pp.

This little book is one of the Lippincott's Thrift Text Series and is edited by Arthur H. Chamberlain, Chairman of the Committee on Thrift Education of the National Education Association.

The author states that he has had two principal thoughts in mind: first, the development of character; second, the introduction of simple thrift lessons which should inspire the pupil with the conviction that economy, self-denial, and prudence are first essentials in the development of a successful business career. The lessons, forty in number, are intended primarily for the eighth and ninth grades. Each lesson is followed by a set of exercises. The following are among the lessons presented: business qualifications, thrift, extravagance and waste, success, bookkeeping and thrift, private personal accounts, boys' and girls' clubs, the household budget and accounts, business forms, filing correspondence and documents, partnership, savings and savings banks and accounts. The materials are well selected for the purpose intended and well presented. With a good, live teacher to motivate the work, this book should prove valuable as an individual reference text.

IRA S. GRIFFITH

GRAVES, FRANK PIERREPONT. *The Maria Hosmer Penniman memorial library of education.* (University of Pennsylvania Bulletin, v. 20, no. 15, May 1, 1920.) Philadelphia: University of Pennsylvania, 1920. 43 pp.

Had this task been undertaken by a bibliographer, he would have compiled a catalog. But this little bulletin is not a catalog. It does more than merely enumerate the titles in the Maria Hosmer Penniman Memorial Library; it so classifies and describes them as to give the reader a brief excursion into the field of the history of education. Both from the standpoint of the treasures it contains, as well as the author's felicitous, yet brief, description of them it is a veritable *hortus deliciarum*, in which even the most casual wanderer can find enjoyment.

News Items and Communications

This department will contain news items regarding research workers and their activities. It will also serve as a clearing house for more formal communications on similar topics, preferably of not more than five hundred words. These communications will be printed over the signatures of the authors. Address all correspondence concerning this department to Walter S. Monroe, University of Illinois, Urbana, Illinois.

Measuring Primary Teaching

The *Texas Outlook* contains a department of school tests and standards edited by L. W. Sackett of the University of Texas. In the September number there is an article on measuring the results of teaching in the primary grades contributed by Leonard Power.

Score Card for Judging Home Projects

The utilization of home projects in the teaching of agriculture has created a demand for an instrument which can be used in judging the success or failure of pupils in carrying on this type of work. To meet this demand, Mr. Carl Colvin, formerly an Associate in Agricultural Education at the University of Illinois, has worked out, in cooperation with a number of other teachers, a score card. In this score card, achievement in home projects is analyzed into seven major elements: (1) plan; (2) record; (3) efficiency in performance; (4) economic income; (5) skills; (6) knowledge; (7) attitudes. The relative amount of credit to be given under each of these heads has been determined. Full information concerning the score card may be secured by addressing Mr. Colvin at the Department of Public Instruction, Springfield, Illinois.

South Dakota Research Association

The first annual meeting of the South Dakota Educational Research Association was held at Aberdeen, June 22-23, 1920, under the auspices of the Bureau of Educational Research. The out-of-state speaker for this meeting was Superintendent H. B. Wilson, Berkeley, California.

Dearborn Group Tests of Intelligence

The publication of group intelligence tests for the primary grades devised by Professor Walter F. Dearborn of Harvard University is announced by the J. B. Lippincott Company of Philadelphia. A manual giving detailed directions for administering the tests has been devised to accompany them. The character of the exercises is indicated by the subtitle of the tests, "Games and Picture Puzzles."

New Tests from the Illinois Bureau of Educational Research

In the price list, issued September first, by the Bureau of Educational Research, University of Illinois, the Bureau announces publication of three new tests, available in November: "Kingsbury Primary Group Intelligence Test," "The Barr Diagnostic Test in American History," and "Illinois Standardized Algebra Test."

The publication of the Kingsbury Primary Group Intelligence Test is particularly opportune. It is generally recognized that the measurement of the intelligence of children in the primary grades, and especially when they enter school, is of special importance. The fact that

the intelligence of these younger children has seldom been measured is due, in the main, to the lack of suitable instruments for group testing. In making available another group test for primary children, the Bureau of Educational Research is rendering a distinct service.

Comparison of Diagnostic Arithmetic Tests

The current number of *The Colorado State Teachers Bulletin* (July, 1920) bears the title, "A Comparison of Three Diagnostic Arithmetic Tests." The Cleveland Survey Tests, the Woody Arithmetic Scales, and the Monroe Diagnostic Tests, each purporting to be diagnostic in their nature, were studied with respect to this function. The conclusions of the study are to the effect that "there is a substantial agreement between the results obtained by using the Cleveland tests and those obtained by using the Monroe tests." However, the Cleveland tests are considered to be superior because they have been more satisfactorily standardized. The Woody Arithmetic Scales are judged to be "decidedly inferior" for the purpose of diagnosing strength or weakness in the operations of arithmetic.

Intelligence of Intermediate and High-School Pupils

The Otis Group Intelligence Scale was administered on April 13 and 16 to 69 boys of the intermediate and high-school grades, ranging in age from thirteen to twenty years. These boys were selected because each was failing in large part, if not altogether, in his regular school work. The purpose was to see if the intelligence test might not shed some light upon the cause of the failure in at least some of the individual cases.

The scores ranged from 49 in the case of a boy nearly sixteen years of age to 175 in the case of another boy of the same age. The median score was 120 which is the standard average for fourteen and one-half years of age. The median age of this group was sixteen years.

Point Scores	No. of Boys
40–49	1
50–59	2
60–69	2
70–79	2
80–89	3
90–99	7
100–109	6
110–119	11
120–129	11
130–139	5
140–149	6
150–159	6
160–169	3
170–179	4
Total	69

I. Q.	No. of Boys
31–40	2
41–50	3
51–60	2
61–70	5
71–80	8
81–90	14
91–100	11
101–110	8
111–120	7
121–130	7
131–140	2
Total	69

The scores for the boys of the various ages were compared with the Otis tentative standard and the given distribution of intelligence quotients was obtained.

As will be noted, less than 35 percent of these boys reached the normal standard of 100. The median falls approximately 10 percent below the standard. Of the 65 percent below normal about one-half are so far below as to account at once for their failure to make good in high-school classes. The failure of at least one-third of the group positively cannot be attributed to mental deficiency if the results of this test are to be relied upon.

H. C. DALEY
Survey Department, Highland Park Public Schools,
Highland Park, Michigan.

Some Results in Using Starch's Arithmetic Reasoning Test

On May 25, 1920 the teachers at Grand Rapids, Michigan, who had taken courses in educational tests and measurements, administered Starch's Arithmetic Reasoning Test to all normal pupils in grades III-VIII. The following is a comparison of the general results for Grand Rapids and Starch's own standards.

TABLE I. SUMMARY OF RESULTS FOR GRAND RAPIDS

Total points for grades III-VIII inclusive	107.7
Total standard points for the same grades	100.8
Difference in points	6.9
Percent above standard	7

TABLE II. GRADE SCORES AT GRAND RAPIDS COMPARED WITH STANDARD SCORES

Scores	Grade											
	VIII		VII		VI		V		IV		III	
	2	1	2	1	2	1	2	1	2	1	2	1
Grand Rapids	13.0	12.3	12.0	11.4	10.7	10.1	9.1	7.8	6.9	5.6	4.8	4.0
Standards[a]	12.8	12.0	11.2	10.4	9.6	8.8	8.0	7.2	6.4	5.6	4.8	4.0
Points above standard	0.2	0.3	0.8	1.0	1.1	1.3	1.1	0.6	0.5	0	0	0
Percent above standard	2	3	7	10	11	15	14	8	8	0	0	0

[a] These are standards calculated for May from Starch's standard June scores.

According to Table I there was at Grand Rapids a total of 107.7 points for all grades, while the total standard points for these grades is 100.8. The difference in points is 6.9 or 7 percent above standard. The 107.7 and 100.8 may be obtained by totaling the scores for each grade in Table II which shows the scores by grades.

In order to understand how each grade stood in respect to the standard, we note its score and the standard score in Table II, find their difference and divide this difference by the standard score. This gives the percent above or below standard. A glance at the table will show that no grade in Grand Rapids schools is below the standard on this particular test. This is not at all surprising when we remember that these same pupils stood 4 percent above standard in rate and in comprehension on Monroe's Silent Reading Test.[1] It might be well for inexperienced teachers to note this fact: that failure to solve verbal problems may be due to a lack of *training in reading rather than a lack of training in numbers*. It might, therefore, be advisable, at least occasionally, to use verbal problems in training pupils in technical reading.

CHAS. D. DAWSON
Assistant Superintendent of Schools,
Grand Rapids, Michigan.

[1] "An experiment in silent reading," *Journal of Educational Research*, 1:414–415, May, 1920.

National Association of Directors of Educational Research

(E. J. ASHBAUGH, *Secretary and Editor*)

What is educational research? What is the function of a bureau of educational research, or measurement, or efficiency, or whatever name your particular bureau may chance to have? I am proposing these questions directly to you, fellow members, but proposing them openly through the pages of our Journal because I think it worth while for us to reason together, within hearing of the hundreds of superintendents who have not yet organized a bureau in their school systems but who are regular and intensely interested readers of our columns.

Courtis and Packer in the January number of the Journal correctly defined the function of a research bureau. They set out definitely that the bureau should furnish the superintendent and other administrative officers with the accurate, detailed information upon which policies can be and should be determined. I have no desire to restate fragmentarily and poorly what they stated so clearly and completely. I merely wish to call attention to one fact in the case, namely that the function of such a bureau includes the gathering and organizing of data on *every* phase of educational work in the system.

The summer call for news concerning your plans for the coming year; the year which has now gotten well under way and the plans for which are already partly accomplished; brought back a response which upon its face would indicate that the bureaus for whose work our membership is responsible planned to function this year in practically two fields alone: (1) measurement of pedagogical results and (2) measurement of general intelligence. It is true that three or four mentioned "the devising of new tests" but that is so closely allied to the first field that it might almost be so classified. Several state that the mental measurement is being done as an aid in administration, for example, in the promotion and classification of pupils. We shall all be greatly interested in the results secured from the use of the tests but it is evident that we are still working in but a small part of the field or that the activities of the bureaus have been reported in these two lines to the exclusion of all others.

What about *child accounting?* How many bureaus have been working on the problem of accurately ascertaining the extent to which the children are taking advantage of the opportunities offered, or the still greater problem of the extent to which the community is recognizing and assuming its responsibility for the educational progress of all its people?

What about *buildings?* How many bureaus are keeping continually before the administrative officers of the system an accurate interpretation of the conditions as they now exist and the best possible indices of future conditions in order that a safe, sane, but wise and progressive program may be developing?

What about *finance?* How many bureaus are keeping close check on receipts and expenditures, on changing values of real estate and assessed or taxable values, on levys and assessments, etc., so that wild rumors and unjust attacks on the financial policy of the school system can be quickly answered with accurate data?

What about *information*, real, accurate, classified, easily usable information, just the kind that one would expect from a bureau of educational research, in any of the many other phases of our complex school problem?

Enough has been said. What about the work of your bureau in these other fields?

PLANS FOR 1920–1921. CLIPPINGS FROM A FEW WHO APPARENTLY PLAN SOMETHING A LITTLE DIFFERENT

Branson, Long Beach, California: "Continue study of best means of grouping and program planning suited to pupil ability. Progress tests in spelling and writing."

Courtis, Detroit, Michigan: "Tests in many new subjects, household economics, lettering, sewing, etc. Measurement of effect of supervision. Measurement of effect of project method."

De Voss, Emporia, Kansas: "Expect to give extension classes in measurement in several cities . . . complete work started last year in new tests in Latin, music and manual training."

Everly, St. Paul, Minnesota: "Arithmetic tests four times during year, grades II-VIII; Ayres Spelling three times during year, grades II-VIII; 100 Demons three times during year, grades II-VIII." (Judging from the elaborate program of testing Mr. Everly put through last spring and the program he outlined for this year, as well as the frequency of the testing, he is not afraid of the use of measurement in St. Paul.—EDITOR.)

Fordyce, University of Nebraska: "Shall attempt to adapt teaching material and procedure to such students as vary markedly from the norm of their grade."

Harlan, Lewiston, Idaho: "Standardize new test in reading in state. State-wide use of Monroe's Reasoning Test in arithmetic."

Henry (Mary Bess), Santa Ana, California: "Additional study of Mexican school children."

McCall, Teachers College, Columbia University: "Construction of several reading scales. Simplification of the procedure of scale construction. Simplification of the procedure for computing class and pupil scale scores."

Theisen, State Department, Madison, Wisconsin: "Problem of school records for cities. Plan to secure greater uniformity and efficiency in record keeping."

(Dr. Theisen has gone to Cleveland. The state department at Madison, however, with Dr. Alexander and Mrs. Flemming on hand and with the probability of the early filling of the vacancy caused by Dr. Theisen's change, will undoubtedly continue to do the customary business. It may be fairly assumed, therefore, that the project to secure greater uniformity and efficiency in record-keeping will be carried through.—EDITOR.)

Sutherland, Los Angeles, California: "Psychological test given 800 teachers applying for positions in our schools, as part of regular examination. Previous examinations indicate teacher median about seventh grade in arithmetic and tenth in silent reading.

"Our force is at work this summer preparing modifications of our adjustment room materials. The old materials and the plan used have brought over one thousand children up to grade during the past two years in thirty schools. We are promised extensions next year.

"As an item of interest to all members of this Association, permit me to call attention to the value of an exhibit of educational and general intelligence tests. Such an exhibit in Los Angeles attracted nearly every principal and a large number of teachers. Result—a huge number of requisitions for tests to be used next year in the Los Angeles schools."